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REACTION TIME: A BIBLIOGRAPHY WITH ABSTRACTS

SUPPLEMENT II – WITH SUBJECT INDEX

Lawrence E. Symington

April 1972

HUMAN ENGINEERING LABORATORY

ABERDEEN RESEARCH & DEVELOPMENT CENTER

ABERDEEN PROVING GROUND, MARYLAND

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Lawrence E. Symington

April 1972

APPROVED: John D. Weisz
JOHN D. WEISZ
Director
Human Engineering Laboratory

HUMAN ENGINEERING LABORATORY
U. S. Army Aberdeen Research & Development Center
Aberdeen Proving Ground, Maryland

ABSTRACT

This bibliography is a 1971 supplement to previous annotated reaction time bibliographies published by the Human Engineering Laboratory. It is a compilation of 232 abstracted references dealing with reaction time in selected human information processing tasks. Most of the references are from the 1971 open literature and are arranged in alphabetical order by author. An alphabetic index of pertinent parameters of investigation is also provided.

INTRODUCTION

This bibliography is a 1971 supplement to previous annotated reaction time bibliographies published by the Human Engineering Laboratory.

In general, the same restraints have been placed on this extension as on the original bibliography. The attempt was made to limit the survey to cognitive determinants of simple and choice RT under the rubric of information processing. While no comprehensive attempt was made to deal with RT measures in such areas as classicial and instrumental conditioning, memory, vigilance, tracking, aging, psychopharmacology, personality, behavioral differences between normals and subnormals, etc; some references from these areas have been included. Most of the reports cited are from the open literature. Dissertations reported in Dissertation Abstracts International (B) for the year 1971 have also been included.

The bibliography is arranged alphabetically by author. An alphabetic index of pertinent parameters of investigation for the references of this extension is also provided.

The first section of this bibliography lists a few pertinent bibliographic sources available in the open literature. The second section provides references, and in most cases, abstracts for reports published mostly in 1971 with some 1972 references from the Journal of Experimental Psychology and the Psychonomic Journals. All abstracts are taken directly from the published articles.

Omissions, other than those described above, were unintentional, and apologies are hereby rendered.

Three organizations have requested us to acknowledge their copyright to abstracts from the following journals:

Academic Press, Inc.:	Cognitive Psychology, Journal of Experimental Child Psychology, Journal of Mathematical Psychology, Journal of Verbal Learning and Verbal Behavior.
American Association for the Advancement of Science:	Science
American Medical Association:	Archives of General Psychiatry

SECTION I

The following publications provide a general, updated bibliographic source for the reaction time literature.

Ergonomic Abstracts

Perceptual and Motor Skills - Motor Skills Bibliographies

Psychological Abstracts

Psychonomic Science - Current literature sections

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SECTION II

Extension to Kamlet, A. S. & Boisvert, L. J. Reaction time: A bibliography with abstracts and Symington, L. E. Reaction time: A bibliography with abstracts. Supplement I - With index for entire bibliography.

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A

892. Anderson, N. H., Grant, D. A., & Nystrom, C. O. The influence of the spatial positioning of stimulus and response components on performance of a repetitive key-pressing task. Journal of Applied Psychology, 1956, 40, 137-141.

Results are reported of an experiment investigating operator efficiency in a key-pressing task as a function of spatial positioning of the stimulus panel and response keyboard. The stimulus panel and the response keyboard occupied positions that were to the left, right, or in front of the operator. The nine possible combinations of positions of stimulus display and response keyboard were used as treatments, using a balanced experimental design on 18 Ss. Two modes of stimulus presentation were employed within each treatment: under self-pacing, S kept his fingers on the response keyboard, matching the stimulus patterns which succeeded one another as fast as they were matched; under automatic pacing, S returned to a rest position between matching successive patterns which were presented approximately 6 sec. apart.

Five sets of scores were taken. Response time and number of key presses (an error index) were measured in both automatic pacing and self-pacing. In addition, latencies were measured in the automatic-paced procedure.

The following results were obtained:

1. With the self-paced procedure, response times were 10% to 15% greater when the stimulus and response units were on opposite sides of the S than for the optimal arrangement where both units were in front of S. The corresponding increase for automatic pacing was 30% to 40%.

2. For automatic pacing, half of the decrease in efficiency arose in the manipulatory process at the keyboard. The other half was associated with the additional movements necessary in the less efficient treatments.

3. No significant differences in errors were observed among the various treatments.

4. Position of the response keyboard exerted a significant effect on all three time measures, the centered position being preferred, and the left position giving poorest results. For automatic pacing, the position of the stimulus panel and its interaction with the response keyboard were also significant factors, the front position being best and the right position poorest.

5. For each time measure, the different treatments showed considerable separation when tested with the Tukey gap test. Generally speaking, placement of response keyboard was more important than location of the display.

The present results are contrasted with increase in response time as great as 1500% obtained in the previous experiments of this series where the effects of interfering with natural angular and linear correspondences of individual stimulus and response elements were investigated.

893. Angel, R. W., Garland, H., & Fischler, M. Tracking errors amended without visual feedback. *Journal of Experimental Psychology*, 1971, *89*, 422-424.

Five *Ss* performed a pursuit tracking test in which the visual feedback was reversed on alternate blocks of target steps. The center of the visual display was screened so that *Ss* could not see the response marker during the initial part of each response. Numerous false moves were corrected at times when the response marker was invisible. The results confirm previous suggestions that errors can be amended by a central mechanism which does not require sensory feedback.

894. Atkinson, R. C., Holmgren, J. E., & Juola, J. F. Processing time as influenced by the number of elements in a visual display. *Perception and Psychophysics*, 1969, *6*, 321-326.

In a visual-detection experiment, a display of several letters was presented, and *S* was to report the presence or absence of a given target letter. Results clearly are incompatible with a self-terminating visual-scanning process as hypothesized by Sternberg (1967). Two models are considered, a serial exhaustive scanning process and a parallel exhaustive process, but findings from the present study do not provide a basis for differentiating between them.

B

895. Barron, R. W. Transfer of information processing strategies in a choice reaction time task. Dissertation Abstracts International (B), 1971, 32, 1867-1868.

896. Bartz, A. E. Reaction time as a function of stimulus uncertainty on a single trial. Perception and Psychophysics, 1971, 9, 95-96.

In a discrete choice-reaction-time experiment, reaction times were measured between the onset of a light and the start of S's pencil toward that light. The reaction time of unpracticed Ss, not aware that their first "practice" trial was being measured, increased as a linear function of stimulus uncertainty. Since this occurred without any prior experience, the effect must have been due to S's set or expectancy regarding the nature of the future task, formed while the instructions for the task were being given.

897. Baxter, B. A study of reaction time using factorial design. Journal of Experimental Psychology, 1942, 31, 430-437.

An investigation of factors affecting RT was conducted with the primary purpose of evaluating the method of factorial design whereby not only the factors investigated but also the interaction of the factors can be evaluated. Three factors were tested: the hand used for response, sensory modality (auditory and visual), and difficulty of discrimination (simple RT, discrimination between 2, and between 3 stimuli). These factors were arranged in a 3X2X2 factorial design, in which each of 6 Ss was presented with 6 of the combinations of these levels in a random order. The results were summarized as follows: a) there was no evidence that RT for the right and left hands were different; b) there were significant differences in the RTs to situations requiring different levels of difficulty of discrimination, the more difficult requiring greater time; c) reactions to visual stimuli require more time than those to auditory stimuli; d) there is a significant interaction between sensory modality and difficulty of discrimination; e) RT varies significantly between individuals; and f) consistent results concerning the main factors were obtained with the use of only 3 Ss arranged in factorial design. Comparing the confounded design of the above experiment with one using simple randomized blocks where each S was measured in all 12 situations instead of only 6, the writer believes the latter to be the more desirable.

898. Beller, H. K. Priming: Effects of advance information on matching. Journal of Experimental Psychology, 1971, 87, 176-182.

A modification of Posner and Mitchell's paradigm was used to clarify the role of advance information on matching. The Ss were shown in advance one of a pair of letters to be matched. This advance information (prime) shortened reaction time to physical matches even when the case of the prime was ambiguous. Priming facilitated name matches even more than physical matches, but only when name code matching was mandatory. The results are interpreted as suggesting that priming affects information processing at two levels, stimulus encoding and memory access.

899. Bernstein, I. H., & Clark, M. H. Intersensory effects in the psychological refractory period. Perception and Psychophysics, 1971, 9, 135-139.

Two experiments examined reaction time (RT) to each of two stimulus events separated by short interstimulus intervals (ISI). The essential contrast was RT to the second visual signal, RT_2, in auditory-visual (A-V) versus visual-visual (V-V) sequences. With response, certain pairings in Experiment 1, an effect apparently demonstrating a single-channel process (Welford, 1952), was noted. RT_2 was generally faster for A-V as opposed to V-V sequences especially when Ss were uncertain as to the sequence that would occur. At 0-msec ISI, the RT_2 difference between sequences approached the RT_1 difference. More rapid RT_2 to A-V sequences was also observed with go versus no-go pairings in Experiment 2 when the initial event was a go signal. However, the RT difference disappeared upon error correction, making the RT_2 sequence difference of questionable relevance to the hypothetical single-channel process. RT_2 was more rapid following a null no-go signal when the no-go signal was contrasted with a visual as opposed to auditory go signal. The latter effect was independent of error and is consistent with channel-switching theory (Kristofferson, 1967).

900. Bernstein, I. H., & Edelstein, B. A. Effects of some variations in auditory input upon visual choice reaction time. Journal of Experimental Psychology, 1971, 87, 241-247.

Experiment I replicated the facilitating effect of irrelevant binaural tone upon two-choice (left vs. right) visual reaction time (RT). This effect was enhanced by monaural tone ipsilateral to the choice and largely eliminated by monoaural tone contralateral to the choice. Comparable effects were obtained in Experiment II using high- versus low-frequency binaural tones and two visual alternatives that were located diagonally with regard to fixation. Auditory and visual stimuli were thus describable as "high" or "low." RT was more rapid when both frequency and vertical position were similar (both high or both low) than when they were opposite (one high, the other low). The RT difference between ipsilateral (Exp. I) or similar (Exp. II) and control visual-auditory pairings were essentially the same when tone conveyed no response information versus when it did convey response information.

901. Birren, J. E., & Botwinick, J. Age differences in finger, jaw, and foot reaction time to auditory stimuli. Journal of Gerontology, 1955, 10, 429-432.

In order to discover whether slowing of reaction time is correlated with path length of the peripheral nerves, two groups, defined according to age (19 to 36 and 61 to 91 years) of 32 subjects each were investigated with regard to differences in finger, jaw, and foot reaction time to auditory stimuli. Results are presented and discussed in terms of differences between age groups and the implications of the findings with finger, jaw and foot reaction for the neurological site of response latency.

902. Blackman, A. R. Influence of stimulus and response probability on decision and movement latency in a discrete choice reaction task. Journal of Experimental Psychology, 1972, 92, 128-133.

The relative frequencies of occurrence of four stimuli and two responses were varied in a discrete choice reaction task. With circles of differing diameter or letters as stimuli, decision time (DT) was significantly shorter for high- than low-frequency stimuli and responses. Movement time (MT) showed corresponding differences with letters, while for the circles only the effect of stimulus frequency bias was significant. The changes in DT with the introduction of stimulus and response bias are interpreted as arising at the stimulus-processing and response-selection stages, respectively. The differences in MT are attributed to the occurrence of erroneous decisions, occurring at either stage, which are corrected before completion of the response.

903. Blum, G. S., & Wohl, B. M. Monetary, affective, and intrinsic incentives in choice reaction time. Psychonomic Science, 1971, 22, 69-70.

A female undergraduate, highly trained and practiced in hypnotic techniques, served as the S in a one-choice reaction-time task carried out under three different incentive conditions. Upon viewing her score in milliseconds after each trial, she referred to a chart converting raw scores to an 11-point scale ranging from +5 to -5. In the monetary condition, each point was worth 5 cents; in the posthypnotically cued affective condition, each point represented a degree of pleasure or anxiety; and in the intrinsic incentive condition, the points had no additional value. Comparisons of the obtained distributions of responses showed no significant differences among the conditions.

904. Boddy, J. The relationship of reaction time to brain wave period; A re-evaluation. Electroencephalography and Clinical Neurophysiology, 1971, 30, 229-235.

Two experiments were performed in an attempt to reproduce the correlations which Surwillo (1963) found between reaction time (RT) and EEG wave period, using different experimental designs, stimulus modalities and period analysis paradigms. Surwillo analysed the EEG sample between the RT stimulus and response, which is likely to be complexly determined because of the contributions of the alpha blocking response and the evoked potential.

In the first experiment a representative mean alpha period (from temporal and occipital derivations) was obtained for each of twelve subjects, using an automated, power spectrum based, period analysis system with which the EEG was sampled for about a minute. A non-significant inter-individual correlation of 0.37 was found between occipital alpha period and visual RT recorded under conditions of high incentive in a subsequent behavioural experiment. The finding was reproduced with an even lower correlation of 0.05 on another group of seventeen subjects.

In the second experiment mean values of the EEG period were determined for twenty subjects from linear measurements on the chart of the 1 sec EEG sample immediately preceding each RT stimulus. The temporal derivation T_3–T_5 was used during auditory RTs and the occipital derivation $T_5 - O_1$ during visual RTs. The inter- and mean intra-individual correlations between EEG period and RT were 0.21 and 0.10, respectively, for auditory RT and 0.26 and 0.10 for visual RT – statistically non-significant in each case. Thus there was a failure to reproduce the finding of Surwillo in both experiments, a discrepancy whose possible sources are discussed.

905. Bostock, H., & Jarvis, M. J. Changes in the form of the cerebral evoked response related to the speed of simple reaction time. Electroencephalography & Clinical Neurophysiology, 1970, 29, 137-145.

The relationship between simple auditory reaction time (RT) and form of the cerebral evoked potential was studied in an experiment with eighteen normal subjects. Stimuli were presented in a fixed relationship to the subject's cardiac cycle, and the data were analysed separately in terms of (1) phase of cardiac cycle at which the stimulus was presented, (2) speed of RT and (3) time in the experiment.

The amplitude and latency of a wave of around 250 msec latency (N_2) were found to relate very strongly, both within and across subjects, to the speed of RT. Amplitudes of earlier components, while also related to RT, were equally or more associated with time in the experiment. The N_2 component was interpreted as an index of the moment-to-moment level of arousal.

Neither the form of the evoked response nor the speed of RT was related to the phase of the cardiac cycle at which the stimulus was presented.

906. Brebner, J. The refractoriness of regular responses. Australian Journal of Psychology, 1971, 23, 3-7.

An experiment on the "psychological refractory period" was performed in which there was event certainty and high temporal certainty about S1. Delays in responding to S2 were less than predicted on an expectancy model or from the single-channel hypothesis when 1 < RT1. A tentative explanation of the data is offered which does not conflict with the single-channel hypothesis.

907. Brown, D. W., & Fox, G. H. The effect of observer redundancy and task difficulty on display-monitoring efficiency. Journal of Psychology, 1965, 59, 267-274.

The study investigated speed and reliability of performance by pairs of human operators as a function of operator redundancy and task difficulty. Eight pairs of subjects responded to all eight combinations of redundancy (redundant and nonredundant), stimulus complexity (four or eight critical stimuli) and critical time duration (one or two seconds). The stimuli consisted of pairs of lights in a four-by-three matrix. Twelve reaction times to critical stimuli were obtained for each pair of subjects for each of the experimental conditions.

Results substantiated the hypotheses that reaction time decreases with decreasing task difficulty and that the nonredundant situation produces a lower reaction time than does the redundant condition. A series of predictions concerning positive errors (false responses) and negative errors (missed signals) were tested. In general, it was found that redundant operation results in fewer negative errors than nonredundant operation for tasks of equal difficulty provided that the tasks are relatively difficult. For positive errors, it was found that, given a sufficiently difficult task, nonredundant operation results in fewer errors than does redundant operation.

908. Burns, J. T. Error-induced inhibition in a serial reaction time task. Journal of Experimental Psychology, 1971, 90, 141-148.

This experiment evaluates the effects of an error on the reaction times (RTs) of subsequent correct responses. It was predicted that correct responses closely following errors would have slower RTs than matched controls. Furthermore, it was predicted that this posterror inhibition would interact with the response-stimulus interval and S-R compatibility, being greater for shorter intervals and less compatible S-R relationships. Twenty-four male students participated in a serial choice RT experiment, and the results clearly supported the predictions. The posterror inhibition is thought to be due primarily to an error-contingent extended psychological refractory period involving a tying-up of the channel capacity. It is suggested that the orienting reflex is a likely attentional mechanism elicited by the detection of an error.

909. Burns, M. M., & Moskowitz, H. Response time to a first signal as a function of time relationship to a second signal and mode of presentation. Perceptual and Motor Skills, 1971, 32, 811-816.

Using a random presentation of inter-stimulus intervals between stimulus 1 and stimulus 2 in a psychological refractory period paradigm, this experiment permitted comparison of data obtained earlier using a block presentation. With 10 male Ss per study, response time to stimulus 1 increased at higher inter-stimulus intervals under block presentations but not under random presentations. The results are interpreted to support time-sharing between the processing mechanisms of the two stimuli rather than a single channel theory.

C

910. Caffrey, B., Jones, J. D., & Hinkle, B. R. Variability in reaction times of normal and educable mentally retarded children. Perceptual and Motor Skills, 1971, 32, 255-258.

The present study explores the differences and variabilities in reaction times of normal and educable mentally retarded children. The reaction times of 10 normal and 10 mentally retarded students (IQ 45 to 70) were tested by the Lafayette visual choice reaction-time test. A Wilcoxon matched-pairs signed-ranks test showed significant differences between the reaction times of the normals and retardates on both the simple and choice tasks. It is suggested that future research should consider other abnormalities, aside from low IQ, that accompany mental retardation.

911. Callaway, E. III. Factors influencing the relationship between alpha activity and visual reaction time. Electroencephalography and Clinical Neurophysiology, 1962, 14, 674-682.

Studies have been reported concerning the relationship between alpha activity and visual reaction time. Evidence is presented to indicate that for a given individual there is an enduring tendency for particular phases of the alpha cycle to be associated with fastest or slowest reaction times. Evidence is also presented to indicate that the alpha phase at which stimulation evokes slowest reaction time is not significantly or consistently shifted by altering the stimulus intensity. This would suggest that alpha phase may be indirectly related to cortical excitability, and stimulus intensity may alter this relationship; or else that alpha phase may become related to reaction time much earlier in the course of neural events than has been suspected.

912. Carron, A. V. Intra-task reliability and specificity of individual consistency. Perceptual and Motor Skills, 1970, 30, 583-587.

The present report is based on reanalysis of data of Marisi (1969) in order to examine the relationship of consistency of motor response among the component responses of a single motor task. One hundred twenty high school Ss were tested on a special task, the rho. A single trial on this motor task can be logically separated into three component motor responses: reaction time, a short circular movement, and a short linear movement. The results indicated that consistency of motor response was moderately reliable within the response components but tended to be response-component specific. Further, both the reliability and specificity of motor-response consistency were independent of the size of the mean performance scores.

913. Carron, A. V. Motor response consistency. Perceptual and Motor Skills, 1971, 33, 111-117.

The purpose of the present investigation was to examine the specificity versus generality of motor response consistency. Thirty right-handed college males were given 200 RT trials a day for 8 days: 4 days on a simple RT task (100 trials per day with the left hand and 100 trials per day with the right hand) and 4 days on a choice RT task (again 100 trials per day with each hand). Thus, 4 RT measures were obtained for each S over 4 test days: simple RT left hand, simple RT right hand, choice RT left hand and choice RT right hand. The reliability of motor response consistency was high for all RT measures, the averages being .797, .830, .780, and .793 for Days 1, 2, 3, and 4 respectively. There was evidence for a moderate general factor between two pairs of measures (the average correlation for left correlated with right hand in simple RT and left correlated with right hand in choice RT was .620 raw and .800 when corrected for attenuation). However, in general, the correlations reflected high task specificity even when corrected for attenuation (average correlation for the remaining pairs of measures was .325 uncorrected, .434 corrected).

914. Carron, A. V. Motor performance and response consistency as a function of age. Journal of Motor Behavior, 1971, 3, 105-109.

The specificity versus generality of motor performance and motor response consistency was investigated as a function of age. One hundred twenty Ss, 30 each at age 7, 11, 15, and 19 yr., were given 120 practice trials (60 trials per session with 24 hr. interpolated between sessions) on both simple and choice RT tasks. For motor performance the reliability of individual differences was high in both tasks at all ages, while the amount of generality was moderately high in the two younger groups but diminished with age. The reliability coefficients for motor response consistency were low for both tasks but, with two exceptions, statistically significant. There was no evidence for generality in motor response consistency at any age.

915. Carron, A. V., & Bailey, D. A. Evidence for reliable individual differences in intra-individual variability. Perceptual and Motor Skills, 1969, 28, 843-846.

In reliability theory, the deviations in an individual's performance from his own mean score are referred to as error and the assumption is made that error scores in a series of repeated tests will be uncorrelated. To test this assumption, 24 college males were given 175 RT trials a day for 5 days (the first day served as a warm-up session and was not used in the analyses). Within each test day, a short rest period was given following every block of 35 trials. When data were examined on a day-to-day basis, i.e., the total 175 trials per day were used, the reliability coefficients were high (.811 to .866); on a block-to-block within-days bases, i.e., the total 175 trials per day were subdivided into 5 blocks of 35 trials, the coefficients were lower but statistically significant (the average block-to-block correlations for test Days 1, 2, 3 and 4 were .639, .704, .734 and .646 respectively). Re-evaluation of reliability theory and its assumption that an individual's deviations from his own mean ability represent error is needed. Present data suggest these deviations from mean ability in a motor skill actually reflect a biological variability and, as such, should be referred to as intra-individual variability.

916. Cavanagh, J. P., & Parkman, J. M. Search processes for detecting repeated items in a visual display. Perception and Psychophysics, 1972, 11, 43-45.

Evidence for successive serial exhaustive searches was found in a task requiring detection of repeated letters in visually presented lists of varying length. The time per comparison was 25 msec. Important differences in processing appeared between instances of adjacent repeated letters and instances of nonadjacent repeated letters.

917. Chase, W. G., & Calfee, R. C. Modality and similarity effects in short-term recognition memory. Journal of Experimental Psychology, 1969, 81, 510-514.

The effects of auditory and visual presentation and test modes using the Sternberg recognition memory task were explored in two studies, with modes varied within Ss in Exp. I and between Ss in Exp. II. Memory lists consisted of consonants that were visually or acoustically similar or were neutral. Reaction time was a linear function of memory set size in all conditions, consistent with a serial search model. Search rate was substantially slower when different presentation and test modes were employed (e.g., visual-auditory or auditory-visual) than when the same mode was used. Acoustically similar lists were searched somewhat more slowly in both studies, but the effects of the similarity variable were relatively slight. The results were discussed in terms of the differences in recall and recognition memory.

918. Checkosky, S. F. Speeded classification of multidimensional stimuli. Dissertation Abstracts International (B), 1971, 31, 5655.

919. Checkosky, S. F. Speeded classification of multidimensional stimuli. Journal of Experimental Psychology, 1971, 87, 383-388.

When two factors were manipulated in a speeded classification experiment—(a) the number of alternative stimuli in a predetermined memory set (M) and (b) the number of dimensions that need to be categorized to insure a correct response (D)—their joint effect on mean reaction time was additive. This is interpreted as evidence that they are mediated at separate information-processing stages. The results are not consistent with Sternberg's exhaustive comparison model. Generation of a visual code for each of the memory set items is proposed to account for the effects of M. A subsequent stage in which this visual code is interrogated dimension by dimension is proposed to account for the effects of D.

920. Chernikoff, R., & Taylor, F. V. Reaction time to kinesthetic stimulation resulting from sudden arm displacement. Journal of Experimental Psychology, 1952, 43, 1-8.

To determine the role of kinesthesis in the control of precise hand and arm movements, it is first necessary to know how rapidly a human can respond to a kinesthetic stimulus. This study was an attempt to determine the reaction time to a kinesthetic stimulus initiated by suddenly dropping S's splinted arm which was held horizontally by an electromagnet. In one situation S responds by releasing a key with his other hand upon awareness of arm fall, and in the second situation he responds by stopping his falling arm as quickly as possible. For purposes of comparison, auditory and tactual reaction times were obtained, with the key-release as the response.

The kinesthetic reaction time with the arm-stop response differed significantly from the other three conditions; no other differences were significant. The difference in kinesthetic reaction time with the arm-stop response and the key-release response was confirmed by a supplementary study.

The shorter kinesthetic reaction time obtained with the arm-stop response is probably a function of the use of an accelerometer to indicate the onset of the response. However, it is still within the range of reaction times for other modalities.

It is concluded that kinesthetic reaction time is too long to permit continuous voluntary control of short-duration hand and arm movements by information furnished through feedback. A dual mechanism of control is suggested, wherein the volitional processes serve the function of intermittently issuing "orders" and the nonvoluntary, lower centers execute these orders without additional voluntary guidance.

921. Christina, R. W. Proprioception as a basis for the temporal anticipation of motor responses. Journal of Motor Behavior, 1970, 2, 125-133.

The present study attempted to distinguish between the proprioceptive Decay and proprioceptive Input Hypotheses of motor timing behavior. The hypothesis that an increased level of proprioceptive cues results in more proficient temporal anticipation was also tested. Ninety male Ss were required to anticipate (no preview) the coincidence of a moving pointer and a stationary one. The timing response was executed with the right hand while 3 levels of proprioceptive cues were indirectly manipulated in the left arm. While results were unable to distinguish between the hypotheses, support was found for the hypothesis that an increased level of proprioceptive feedback administered during the interval can increase anticipatory response consistency.

922. Christina, R. W. Minimum visual feedback processing time for amendment of an incorrect movement. Perceptual and Motor Skills, 1970, 31, 991-994.

The average minimum time required by a performer to amend an incorrect movement based upon his ability to process visual feedback is discussed. Further, a decremental effect of the psychological refractory period on minimal visual feedback processing time is suggested.

923. Christina, R. W. Movement-produced feedback as a mechanism for the temporal anticipation of motor responses. Journal of Motor Behavior, 1971, 3, 97-104.

That part of the input hypothesis of motor timing behavior which postulates that movement-produced feedback can serve as a mechanism for the temporal anticipation of motor responses was tested. Thirty-two male college Ss temporally anticipated (no preview) the coincidence of a moving pointer with a stationary one and executed the timing response with his right hand while either a high (HFB) or low (LFB) level of movement-produced feedback was indirectly manipulated in the left arm. The HFB group temporally anticipated with greater accuracy than the LFB group which supported that part of the input hypothesis being tested. Apparently, Ss were relying on proprioceptive feedback about the position of their left arm movement to cue the timing response of their right hand.

924. Clifton, C., Jr., & Birenbaum, S. Effects of serial position and delay of probe in a memory scan task. Journal of Experimental Psychology, 1970, 86, 69-76.

In a task in which Ss indicated whether a probe digit was a member of a previously seen list, the effect of the position of the probed item in the list upon the speed of correct "yes" responses was studied by factorially varying the number of digits that preceded and the number that followed the probed item in the list. Such responses were found to be faster when the probed item came near the end of the list, provided that the probe was presented within .8 sec. after the end of the list. Ancillary findings were the following: (a) While the functions relating reaction time (RT) to the length of the memorized list were primarily linear increasing, minor but reliable deviations from linearity were noted for "yes" responses at List Lengths 1 and 2, and (b) while 9 of 12 Ss showed parallel functions relating RT to list length, 3 Ss showed functions for "no" responses that were twice as steep as their functions for "yes" responses.

925. Cohen, G. Differential effects of irrelevant dimensions in three shape recognition tasks. British Journal of Psychology, 1971, 62, 151-156.

Three shape recognition tasks are examined: matching two shapes, matching a written name to a shape, and naming shapes orally. In each the relevant dimension is shape, but the irrelevant dimensions of colour, orientation and proportion are varied. The effect of changes in the irrelevant dimensions in each task is used to infer the degree of specificity present in the internalized standard against which the test stimulus is matched. The fact that name—visual matches resemble visual—visual matches rather than naming latencies indicates that comparison in this task is based on a generated visual code.

926. Corballis, M. C., Miller, A., & Morgan, M.J. The role of left-right orientation in interhemispheric matching of visual information. Perception and Psychophysics, 1971, 10, 385-388.

Three experiments are described in which Ss matched left or right-pointing arrowheads presented simultaneously in each visual field. In the first two, they were instructed to press one button as quickly as possible if the stimuli were the same and another if they were mirror images. In the third experiment, they pressed a single button only if the stimuli were the same on half the trials and only if they were mirror images on the other half. This experiment also included a control condition using up- and down-pointing arrowheads. In all three experiments, "same" RTs were shorter than "mirror" RTs, suggesting that left-right orientation is preserved, rather than mirror-reversed, in interhemispheric matching. This result is also contrary to previous evidence that left-right symmetry is perceptually more salient than adjacent repetition of the same pattern.

927. Cotten, D. J., Thomas, J. R., & Stewart, D. Immediate effects of cigarette smoking on simple reaction time of college male smokers. Perceptual and Motor Skills, 1971, 33, 336.

928. Crawford, A. The perception of light signals: The effect of the number of irrelevant lights. Ergonomics, 1962, 5, 417-428.

The experiment described was carried out to find the effect of the number of irrelevant lights on the human response time to light signals appearing amongst them. Both the signal lights and the irrelevant lights could be made steady or flashing; this produced four conditions of coding of the signal lights from the background, e.g. flashing signal with steady background and so on. It was found that the geometric mean response-time increased to an unusually large extent, from 0.8 sec with no background lights up to nearly 2 sec with 21. A background of flashing lights was found to increase the response-time more than a background of steady lights, whether the signal was flashing or not. The shortest response-times were obtained when flashing signals were seen against a steady background, and the longest with flashing signals against a flashing background. Thus it is concluded that flashing signals should not be used in conditions where a number of them may appear together within the field of view.

D

929. Danev, S. G., De Winter, C. R., & Wartna, G. F. On the relation between reaction and motion time in a choice reaction task. Acta Psychologica, 1971, 35, 188-197.

Under two experimental conditions the relation between the reaction time (RT) and the motion time (MT) in a choice reaction task was studied. In a condition 'without time stress' RT and MT turned out to be directly proportional, whereas in the 'time stress' condition RT and MT were inversely related. From these observations it was inferred that under 'time stress' Ss are able to compensate a long RT by means of a short MT. In a second experiment it was shown that the compensation is made consciously: Ss being aware of relatively small fluctuations in their RT adapt consciously the complexity of a required motor response to the length of a given RT in order to finish the total reaction in time.

930. Danev, S. G., Wartna, G. F., Bink, B., Radder, J. J., & Luteyn, I. Psychophysiological assessment of information load. Nederlands Tijdschrift Voor de Psychologie en Haar Grensgebieden, 1971, 26, 23-39.

An experiment attempted to assess the load of two different levels of information processing by some generally used and some new psychophysiological methods.

The results obtained indicate that behavioural parameters, in this case reaction time, misses, mistakes and the performance on a secondary task, are most appropriate for distinguishing between the conditions. The physiological parameters (HR and RR) discriminate mainly between the Ss. HR and RR variability, scored according to eight different scoring methods, did not turn out to be reliable indicators for differences between the conditions.

The relation between reaction time and various phases of the cardiac and respiratory cycle, and the length of time during which the button is held pressed down in answer to signals were significantly related to the level of information load.

931. Davis, R., & Schmit, V. Timing the transfer of information between hemispheres in man. Acta Psychologica, 1971, 35, 335-346.

A comparison was made between the times required to record, by a manual response, a judgement of 'same' or 'different' on two signals which were presented simultaneously either to the same or different hemispheres.

Two main effects emerged. (1) Reaction times were shorter when the two signals were presented each to different hemispheres compared with presentation of both signals to the same hemisphere. (2) Reaction times were shorter for 'same' than for 'different' judgements. This effect did not interact with the hemisphere effect and may therefore be assumed to be independent.

When both signals went to the same hemisphere there was no significant difference between left hemisphere presentation and right hemisphere presentation. Nor was there a significant difference between left hand and right hand responses.

Some implications of these results for the study of interhemispheric transmission of information are discussed.

932. DeRosa, D. V., & Beckwith, M. Retrieval of information from organized memory sets. Psychonomic Science, 1971, 23, 177-179.

A recognition reaction time (RT) investigation examined retrieval of individual elements from memorized sets of digits. The sets varied in organization and the delay between presentation of the items, and a recognition test was systematically manipulated. Organized sets produced faster reactions than unorganized sets. Serial position effects were less pronounced and operative for a shorter period of time with organized material.

933. Dick, A. O. Processing time for naming and categorization of letters and numbers. Perception and Psychophysics, 1971, 9, 350-352.

A reaction-time experiment was carried out to examine the relationship between naming and categorization. Ss were shown one item at a time and asked either to name the item or to categorize the item as a letter or number. The size of the stimulus set was varied systematically across Ss. Naming time increased as the stimulus set size increased; categorization time could be predicted by the time required for naming, plus a constant. These results were interpreted as indicating that naming must precede categorization.

934. Doll, T. J. Motivation, reaction time, and the contents of active verbal memory. Journal of Experimental Psychology, 1971, 87, 29-36.

This study demonstrates the effect of motivation on information exchange between active and inactive memory. Two sets of verbal items—one recently viewed and the other memorized earlier—were presented for recognition. In one condition, reward was contingent on reaction time (RT) to recent probes only; in another condition, reward was contigent on RT to memorized probes only. In both conditions, RT was fastest to the items that were eligible for reward. Other findings suggest that this result is due to Ss' strategy of transferring the eligible set to active memory and consequent displacement or decay of ineligible items. First, error rate for recent probes was greater when they were ineligible than when they were eligible. Second, the difference in RT for eligible and ineligible items increased with the amount of time the eligible set could be stored in active memory. Third, the effect of increased time in active memory depended on the stringency of the RT criterion for reward. And finally, the serial position functions for eligible items were generally indicative of rehearsal, while those for ineligible items were typical of unrehearsed items.

935. Donchin, E., & Lindsley, D. B. Average evoked potentials and reaction times to visual stimuli. Electroencephalography and Clinical Neurophysiology, 1966, 20, 217-223.

Averaged evoked potentials to brief light flashes were recorded from occipital, vertex, temporal and orbital leads in 10 Ss during a reaction time study. Subjects performed under 2 conditions, with and without knowledge of results. The amplitude of the average evoked potentials was related to reaction time. For any given sequence of reaction times, faster reactions were associated with larger amplitude average evoked potentials. Knowledge of results shortened reaction times and increased the magnitude of average evoked potentials. The diffuse and non-specific character of the main component of the average evoked potential appears to reflect changes in cortical excitability associated with the variability of reaction time. This result has been interpreted in relation to the non-specific arousal and alerting mechanism.

936. Downing, B. D.: Response probabilities and "same-different" reaction times. Perception and Psychophysics, 1971, 9, 213-215.

A "same-different" reaction-time (RT) task with multidimensional stimuli was used with a 50:50 and a 75:25 proportion of "different" to "same" response. The "different" RTs to each dimension were similar for the two proportions. However, the "same" RT in the 50:50 condition was faster than the "same" for the 75:25 condition and faster than the slowest "different" RT. Interpretations of the results in terms of response bias and processing criteria are offered.

937. Dudley, L. M. The effects of arousal and attention on central, autonomic, and behavioral processes. Dissertation Abstracts International (B), 1971, 32, 2416.

938. Duke, M. P. Reaction time and normetanephrine-metanephrine excretion under intense stimulation in chronic schizophrenics, non-psychotics, and normals. Perceptual and Motor Skills, 1971, 32, 579-586.

Differential predictions stemming from opposing arousal theories of chronic schizophrenia were examined in terms of reaction time performance and metanephrine-normetanephrine excretion in arousing situations. It was found that schizophrenics and non-psychotics both manifested behavioral deficit; schizophrenics' normetanephrine level was lower than that of other groups; reactivity of schizophrenics and normals, both behavioral and biochemical, was similar; non-psychotics demonstrated a tendency toward no behavioral reactivity to intense stimulation but manifested a biochemical response not different from other groups. A theoretical conceptualization of behavioral and biochemical change in response to increasingly intense stimulation was developed utilizing two hypothesized cumulative reactivity functions.

939. Dumas, J. S. An examination of the exhaustive processing of multi-dimensional stimuli. Dissertation Abstracts International (B), 1971, 31, 6926.

940. Dyer, F. N. Word reading, color naming and Stroop interference as a function of background luminance. Report No. 889, U. S. Army Medical Research Laboratory, Fort Knox, Kentucky, 20 August 1970.

Response times were recorded for six Ss while naming colors in conditions with and without interference to color naming and also while reading words. Processing rates of word and color information were manipulated by varying the background luminance of the color stimuli. Interference to color naming from incongruent color words was found to be high when word reading was fast relative to color naming and to a lesser extent the reverse was also true. The relevance of this paradigm for the study of information processing is discussed.

941. Dyer, F. N. Latencies for matching of word-color pairs with "irrelevant" words or colors. Report No. 920, U. S. Army Medical Research Laboratory, Fort Knox, Kentucky, 26 February 1971.

Latencies for SAME and DIFFERENT judgments resulting from comparisons between words and colors were determined with one of the pair of stimuli being both a word and a color. The irrelevant aspect of this dual stimulus bore each of five possible relationships to the stimuli that were relevant to the match. These five conditions plus two control conditions produced large differences in latencies for making comparisons. Correspondence between the irrelevant stimulus and the combined relevant stimulus facilitated SAME responses but showed no facilitation of DIFFERENT responses. In some conditions irrelevant words delayed matches between words and colors more than irrelevant colors delayed such matches. This suggests that central comparisons between the pair of stimuli were in a form more closely related to words than to colors.

E

942. Eason, R. G., & Dudley, L. M. Physiological and behavioral indicants of activation. Psychophysiology, 1970, 7, 223-232.

The present study demonstrates that various central and peripheral physiological variables are similarly altered by experimentally induced changes in activation while being dissimilarly altered during the course of a trial by unknown factors. That is, both general and specific physiological changes are demonstrated in a single experiment. Activation level was experimentally altered by having S (a) react to light flashes under threat of shock, (b) react to flashes without any such threat, and (c) passively observe light flashes. Evoked cortical potentials, heart rate, skin conductance, and muscular tension were similarly affected by these experimental conditions, but the variables showed differential changes over time. It was concluded that these physiological processes simultaneously reflect both generalized arousal and directionally fractionated activity.

943. Egeth, H. Laterality effects in perceptual matching. Perception and Psychophysics, 1971, 9, 375-376.

Two experiments are reported in which Ss had to indicate whether pairs of simple geometric forms were "same" or "different." In Experiment 1 the two forms were either both in the left visual hemifield or both in the right hemifield. Reaction times were unaffected by the locus of the stimuli. In Experiment 2, in addition to left and right pairs, there were pairs in which one of the stimuli was on the left and the other was on the right. Under these conditions, reaction times were faster for pairs totally on the left than for pairs totally on the right. The data support the notion that implicit scanning patterns are important in determining laterality differences. When such scanning is not involved and when simple nonverbal stimuli and responses are employed, laterality differences are eliminated.

944. Egeth, H., & Blecker, D. Differential effects of familiarity on judgments of sameness and difference. Perception and Psychophysics, 1971, 9, 321-326.

Ss indicated whether pairs of simultaneously presented objects were "same" or "different." In Experiments 1, 2, and 3 the stimuli were pairs of letters, and familiarity was manipulated by showing the letters in either an upright or an upside-down orientation. In Experiments 4 and 5 the stimuli were pairs of trigrams, and familiarity was manipulated either by rotation or by selection according to rated meaningfulness. Analysis of reaction times indicated that familiar pairs were responded to more quickly than were unfamiliar pairs; however, this was true only for "same" judgments, not for "different" judgments. In addition, Experiment 3 indicated that familiarity influenced discrimination accuracy under conditions of tachistoscopic exposure. Finally, in Experiment 6 an effort was made to disentangle the effects of meaningfulness from the effects of pronounceability. The present results stand in contrast to previous research using perceptual comparison tasks, since the earlier work failed to indicate any effect of familiarity.

945. Eichelman, W. H. Familiarity effects in the simultaneous matching task. Journal of Experimental Psychology, 1970, 86, 275-282.

Two experiments were designed to determine how familiarity affects the amount of time it takes Ss to decide whether two strings of letters are the same or different. In Exp. I, the reaction time (RT) for two words was compared to the RT for two random strings of letters. The number of letters per string was also varied. It was found that the familiar word strings could be compared more quickly than the random strings and that this difference increased as the number of letters per string increased. Experiment II was designed to decide if Ss are reading the word strings and processing their names. If this were true, it should make little difference if the strings to be matched were printed in different cases. However, a large difference between different-case and same-case stimuli was found for both random and word strings. Therefore, it is felt that familiarity with the stimulus material can affect stages of processing concerned with the physical characteristics of the stimulus.

946. Ellingstad, V. S., Heimstra, N W. Performance changes during the sustained operation of a complex psychomotor task. Ergonomics, 1970, 13, 693-705.

Exposed 15 male 21-26 yr. old graduate and medical students to a primary tracking task and a variety of subsidiary tasks for a total of 15 hr. Tracking performance was assessed through the use of 2 error measures, amount of time off the target track, and number of times off target. Subsidiary performance tasks included: a vigilance task, 2 RT tasks, mental multiplication, and digit span. In addition, 3 physiological measures were obtained. A significant decrement in tracking performance was obtained for both measures utilized. This decrement was not particularly abrupt, but occurred cumulatively over the entire course of the experiment. There was no clearly established performance decrement on the subsidiary tasks utilized. A marked variability in performance over the course of the experiment session was characteristic of performance on these tasks. Performance on the vigilance task, and 1 of the RT tasks improved during the 15-hr test session. 17-ketosteroid and 17-hydroxycorticoid values increased during the session but only in the case of the latter was the increase significant. The eosinophil count of Ss exposed to the test conditions decreased steadily throughout the experimental session. However, eosinophil measures obtained from control Ss increased during a similar time period.

947. Ellis, S. H., & Chase, W. G. Parallel processing in item recognition. Perception and Psychophysics, 1971, 10, 379-384.

It is shown that in Sternberg's item recognition task Ss need not make a judgment of the absolute size or color of the test item before comparing it with memory. However, Ss do use size or color information, when possible, to reduce long reaction times for large memory loads. The results suggest that Ss are able to scan memory for form in parallel with testing for gross stimulus features, like size or color. This finding has important implications for sequential two-stage theories of attention.

948. Emmerich, D. S., Gray, J. L., Watson, C. S., & Tanis, D. C. Response latency, confidence, and ROCs in auditory signal detection. Perception and Psychophysics, 1972, 11, 65-72.

Response latencies were obtained from 10 Ss in auditory signal-detection experiments. The response latencies were inversely related to certainty that a signal was (or was not) presented. The S's decision criterion was found to have an influence on response latency, which was consistent with the hypothesis that stimuli close to the current criterion elicit longer response latencies than stimuli more distant from the criterion. Comparisons among receiver operating characteristics derived from binary decisions, from the latencies of binary decisions, and from confidence ratings show that response latencies and binary decisions together yield more information about the stimulus than does the binary decision alone. However, the increment in information gained from the measurement of response latencies is in general (though not for every S) smaller than that gained by shifting from yes-no responses to a confidence-rating procedure.

949. Eriksen, C. W., & Hoffman, J. E. Some characteristics of selective attention in visual perception determined by vocal reaction time. Perception and Psychophysics, 1972, 11, 169-171.

Previous research had found that the accuracy with which a S could report an indicated letter or target in a briefly exposed multiletter display decreased as the number of irrelevant letters increased, and accuracy increased if the position of the target letter was indicated 150 msec before the display was presented. In the present experiment, these variables were reinvestigated using vocal reaction time as the dependent variable. An interpretation of the accuracy measures in terms of differential processing times was supported. The results of the two experiments were discussed in terms of a model of attentional selectivity.

F

950. Fisher, D. F. The compromise response: Fact or artifact? Psychonomic Science 1971, 25, 67-68.

Two experiments were conducted to examine the effects of congruity on perceptual recognition. The first experiment attempted to replicate the findings of Bruner and Postman (1949) with regard to compromise and dominance response types. The results failed to confirm the occurrence of compromise responses, but the dominance responses were present. Evidence is given for a hierarchical structure in the perceptual system which orders stimulus dimensions according to some predetermined criteria in order to facilitate identification. In the second experiment, when congruity was degraded, compromise responses did occur and were accounted for by a conflict in implicit set.

951. Fjeld, S. P. Motor response and muscle action potential in the measurement of sensory threshold. Psychophysiology, 1965, 1, 277-281.

There was a significant improvement in the accuracy of detection of visual stimuli at or below Ss' thresholds when detection was measured overtly by gross muscle movement responses and covertly by muscle action potential (MAP responses, as opposed to overt responses alone). In addition to yielding a lower threshold value for the series of light stimuli, the MAP measures became more useful as an indicator of accuracy at the weaker rather than the brighter light values, whereas the overt response measures became relatively less useful. These results suggest that events of which the S is "unaware" (covert responses) can convey information about performance to an experimenter, provided suitable methods of measurement can be devised.

952. Foss, D. J., & Dowell, B. E. High-speed memory retrieval with auditorily presented stimuli. Perception and Psychophysics, 1971, 9, 465-468.

Two groups of 8 Ss memorized three lists of consonantal phonemes. The length of the memorized lists (M) was one, two, and four phonemes. Test words were presented, and reaction time (RT) for S to say whether or not the word started with a member of the memorized list was measured. RT increased with M. In one group, the phonemes comprising the memorized sets were dissimilar. RT increased linearly with M for that group. In the other group, the phonemes comprising the sets were similar. The function relating RT to M appeared to deviate from linearity. Even after extended practice, all the evidence was consistent with a somewhat modified serial model of memory retrieval.

953. Foulke, E., Caotes, G. D., & Alluisi, E. A. Decoding of electrocutaneous signals: Effects of dimensionality on rates of information transmission. Perceptual and Motor Skills, 1966, 23, 295-302.

Each of four electrocutaneous codes, alike with respect to the number of code signals, but different with respect to the dimensions used in composing the signals, was learned by 10 Ss. When response time (RT) was used as the index of performance after practice, the codes were ranked in order of increasing difficulty (or RT) as follows: the location code, location-by-intensity, location-by-duration, the location-by-intensity-by-duration codes. When errors were taken as the index of performance and when Ss had received a moderate amount of practice, the codes were arranged in order of increasing difficulty (or errors) as follows: the location-by-intensity code, location-by-duration, the location code, and the location-by-intensity-by-duration code. When the rate of information transmission (which takes into account both time and errors) was employed as the index of performance, the codes were ranked in order of increasing difficulty (or decreasing efficiency) as follows: the location-by-intensity code, the location code, location-by-duration, and the location-by-intensity-by-duration code.

954. Friedman, H., & Taub, H. A. The transcephalic DC potential and reaction time performance. Psychophysiology, 1969, 5, 504-509.

The relationship between transcephalic DC potential changes and simple serial reaction time performance was investigated with the hypothesis that Ss exhibiting more positive TCDC shift would be slower in RT performance than Ss with less positive (or negative) shift. In two experiments, measurements of shift in DC from an initial pre-performance reading to points just before, during, and following RT performance were made. Equal division into groups based on those Ss with most shift in a positive direction versus those with least positive (or negative) shift provided two groups of 12 male Ss in Experiment I, which used constant intertrial interval, and two groups of 11 Ss each in Experiment II, which used random intertrial intervals. The differences in performance between the groups were consistently in the direction expected by the hypothesis. In Experiment I, analysis of variance revealed significant interactions between groups and RT performance blocks over time. Significant differences between groups as well as significant interaction effects were found in Experiment II.

955. Fuchs, A. H. Response latency and serial position in short-term memory. Psychonomic Science, 1971, 22, 75-76.

A serial position effect was observed in latency scores when a visually presented test element was correctly identified as having a particular serial location in a memorized serial list. The effect was not observed in a choice reaction-time task which made similar response requirements. The data suggest that the serial position effect for latency scores, as for error scores, arise in memory tasks in which the identification of a position in a list is critical for correct responding.

G

956. Gazzaniga, M. S. Reply to McKeever and Huling. Psychonomic Science, 1971, 22, 222-223.

957. Geer, J. H., Davison, G. C., & Gatchel, R. I. Reduction of stress in humans through nonveridical perceived control of aversive stimulation. Journal of Personality and Social Psychology, 1970, 16, 731-738.

In a reaction time (RT) task 40 subjects were told to react to the onset of a 6-second shock. Following 10 trials, half of the subjects were told that by decreasing their RT they would reduce shock duration. Remaining subjects were simply old that shock duration would be reduced. All subjects, regardless of group assignment or RT, received 3-second shocks in the second half of the study. During the second half of the study, subjects who believed they had control showed fewer spontaneous skin conductance (SC) responses and smaller SC responses to shock onset than subjects who did not feel they had control. Results indicated that perception of effective control, even if not veridical, can affect autonomic responding. Discussion of related research and implications of the results are included.

958. Geffen, G., Bradshaw, J. L., & Wallace, G. Interhemispheric effects on reaction time to verbal and nonverbal visual stimuli. Journal of Experimental Psychology, 1971, 87, 415-422.

Response times were found to be sensitive to laterality differences in visual perception. Nonverbal stimuli, such as faces, were processed faster when presented in the left visual field. Conversely, stimuli which were verbally encoded and required an identificatory response were processed more quickly when presented in the right visual field. These differences could be due either to the time taken to cross from one cerebral hemisphere to the other or to asymmetries between the hemispheres in their capacity to process verbal and nonverbal material, or to both.

959. Geller, E. S., Whitman, C. P., & Beamon, W. S. Effects of expressed and measured value preference on decision speed. Psychonomic Science, 1971, 24, 84-86.

Decision speed was studied as a function of value preference determined by a subjective and a measured ranking of the six value areas of the Allport-Vernon-Lindzey Study of Values (AVL). Ss were sequentially presented with a list of 180 value-related words and were required to categorize each word into one of the six AVL value areas by pressing one of six decision levers. The latency between each stimulus presentation and the decision response was measured without S's knowledge. Decision speed was significantly influenced by practice and personal value preference. For each method of determining value rank, an inventory (AVL profile) and a subjective (introspective ranking) technique, the relationship between speed and value rank was generally U-shaped (i.e., words representing the most and least preferred value areas were categorized fastest).

960. Geller, E. S., Whitman, C. P., Wrenn, R. F., & Shipley, W. G. Expectancy and discrete reaction time in a probability reversal design. Journal of Experimental Psychology, 1971, 90, 113-119.

Independent effects of prediction, probability, and run length on choice reaction speed (RS) were determined in a probability reversal design. One of two stimulus alternatives occurred on 70 percent of the initial 150 presentation trials; then the relative frequencies were reversed for 150 trials. Prior to each stimulus presentation, Ss made a prediction; following each presentation, Ss identified the stimulus by pressing a left or right trigger. Choice RS was markedly faster to correctly predicted events. With prediction outcome controlled, choice RS was significantly influenced by probability and run length. For prereversal and postreversal trials choice RS was faster to the more probable stimulus. As hypothesized by expectancy notions, the effect of run length on choice RS was dependent upon which stimulus was repeated.

961. Gescheider, G. A., & Wright, J. H. Reaction time as a function of magnitude estimations of vibrotactile internal noise. Journal of Psychology, 1971, 79, 91-95.

Vibrotactile signals were presented to S's index fingertip during a specified observation interval at a signal probability of either .30 or .70. The S's task was to report the presence or absence of the signal as quickly as possible and to estimate the magnitude of the sensory event experienced during the observation interval. The relationship between reaction time and estimated sensory magnitude was established for each of four Ss. Reaction time was found to vary systematically with estimated sensory magnitude. This finding was interpreted as support for the hypothesis that S's decision time is longer, the closer on the sensory continuum a particular observation is to his decision criterion.

962. Gibbon, J., & Rutschmann, R. Temporal order judgment and reaction time. Science, 1969, 165, 413-415.

A model which predicts judgment of the temporal order of stimuli from simple reaction time is proposed. Visual data show covariation of the two measures with luminance changes, and suggest that (i) temporal order judgments reflect a biased response criterion and (ii) the motor component of reaction time has little variability relative to variance in receptor system latency.

963. Gilinsky, A. S., & Cohen, H. H. Reaction time to change in visual orientation. Perception and Psychophysics, 1972, 11, 129-134.

The aftereffects of viewing diagonal lines for 50, 500, and 1,000 msec were measured by the speed and accuracy of identification of a variably tilted test grating. Significant RT and tilt aftereffects were found as functions of the duration of orientation-specific adaptation and the angle of separation between inspection and test lines. The results throw light on anchoring effects of the main visual coordinates and support a structural interpretation of orientational selectivity in human vision.

964. Gossman, J. R. Short term memory and processing mode in multidimensional stimulus discriminations. Dissertation Abstracts International (B), 1971, 32, 1874.

965. Gottsdanker, R., & Stelmach, G. E. The persistence of psychological refractoriness. Journal of Motor Behavior, 1971, 3, 301-312.

The view that psychological refractoriness is a fundamental characteristic of human performance was supported by its survival of a determined attempt to eliminate it through training. A S was given practice for 87 days on a successive choice-response task with a constant inter-signal interval of 100 msec. Although his performance became better than any exhibited by Ss with more typical practice, he was not able to reduce psychological refractoriness to less than 20 or 25 msec. Moreover, when S was then shifted to variable inter-signal intervals he showed greater than the usual amount of psychological refractoriness at the intervals next longer than 100 msec. This indicated that he had learned a special skill rather than a generally "less refractory" mode of response (or merely better technique on the separate tasks). Training was found to be an effective way of eliminating holding back on the first response.

966. Gottwald, R. L., & Garner, W. R. Effects of focusing strategy on speeded classification with grouping, filtering, and condensation tasks. Perception and Psychophysics, 1972, 11, 179-182.

Speeded classification was studied with three tasks varying in the way in which extra stimuli are provided for a single class: grouping, with additional levels on a single relevant dimension; filtering, with additional levels on an irrelevant dimension; and condensation, with additional levels on a second relevant dimension. (Both relevant dimensions must be processed for correct classification.) For the dimensions used (color and form), filtering was easiest, followed by grouping and condensation. In the latter two cases, asymmetric classifications, in which one class had a single member, eliminated the difficulty of classification. The presumed mechanism is focusing, in which the single stimulus is seen as a positive set and all other stimuli as negative.

967. Graboi, D. Searching for targets: The effects of specific practice. Perception and Psychophysics, 1971, 10, 300-304.

This study contrasts the effects of specific practice vs nonspecific practice in scanning for sets of five-letter targets. Ss were required to search for new targets after extended practice with one specific target set. Simultaneous memory search was not supported, since searching for one item remained faster than for several items. Serial exhaustive memory search was not supported since the search data were nonlinear. There is evidence that the categorization of a target, even after large amounts of specific practice, is not heavily dependent upon its physical features. A strategy change was detected during practice which allowed more efficient search. It is concluded that a single memory search process can account for the data under both high and low levels of specific practice.

968. Green, D. M. Fourier analysis of reaction time data. Behavior Research Methods and Instrumentation, 1971, 3, 121-125.

The popularity of the assumption of stages in models of the reaction time process and the availability of fast and efficient means of computing approximations to the Fourier transform makes the Fourier analysis of reaction time data attractive. This paper indicates some problems associated with such analyses and suggests convenient ways to overcome some of the difficulties.

969. Green, D. M., & Luce, R. D. Detection of auditory signals presented at random times: III. Perception and Psychophysics, 1971, 9, 257-268.

Reaction times to a pure tone in noise were measured. Throughout, the time from the warning signal to the reaction signal was exponentially distributed, and the signal was response terminated. Response criterion, signal intensity, and mean foreperiod wait were varied. A model that assumes a Poisson sensory transduction, a pulse-activated decision process, and an additive bounded residual process was tested. It was concluded that the assumed decision process was in error. Among the empirical results, the dependence of mean reaction time on signal waits was shown to depend largely on the average wait, not the actual one, and that this relationship between mean reaction time and average stimulus wait increased for strong signals and decreased for weak ones.

970. Greenwald, A. G. Selective attention as a function of signal rate. Journal of Experimental Psychology, 1970, 86, 48-52.

The task for 20 Ss was to respond to a series of visually presented digits by speaking each digit's name as rapidly as possible. Half of the digits were accompanied by a simultaneous conflicting auditory digit and half by an auditory tap. Each S provided data for this task at trial rates of one every 1.0, 2.0, 4.0, or 8.0 sec. At all trial rates, reaction times to the auditory digit trials were slower than those to the tap trials, indicating inefficient selective attention to the visual digits. However, there was a significant decrease in this difference as intertrial interval increased ($p < .01$), indicating that selective attention efficiency increased as trials were increasingly separated. These findings were discussed in relation to selective attention formulations that have been developed primarily from studies of selective listening to one of two auditory inputs.

971. Grill, D. P. Variables influencing the mode of processing of complex stimuli. Perception & Psychophysics, 1971, 10, 51-57.

The present study attempts to specify some of the conditions under which parallel and serial processing may occur. The three variables studied were (1) type pf task, (2) relative set for speed vs accuracy, and (3) practice. Pairs of multidimensional, geometric stimuli were presented either simultaneously or successively to S who was required to indicate whether they were the same or different. Each S participated in nine sessions. For half of the Ss speed was emphasized, and for the other half accuracy was emphasized. The results indicated that: (1) responses were faster with successive presentation than with simultaneous presentation; (2) with successive presentation, processing was serial; (3) in the simultaneous presentation condition, a gradual shift from serial to parallel processing occurred with practice; and (4) the speed and accuracy instructions used in this experiment produced no differential effects on latency or errors.

H

972. Ham, M. W., & Edmonston, W. E. Hypnosis, relaxation, and motor retardation. Journal of Abnormal Psychology, 1971, 77, 329-331.

Thirty undergraduates scoring 4 or better on the Barber Suggestibility Scale were equally divided into three groups: (a) alert hypnotic induction, (b) relaxation hypnotic induction, and (c) relaxation control. Reaction time (RT) of the alert group was significantly faster than that for the other two groups, which did not differ from one another. A significant increase in RT over trials was manifested by the latter two groups. Results are discussed in relation to the altered state of consciousness concept of hypnosis.

973. Hannes, M. The effect of right and wrong guesses on two-choice reaction time. Journal of Psychology, 1971, 78, 241-252.

The effect of right and wrong guesses on two-choice RT was investigated under the following conditions: 20 percent, 40 percent, 60 percent, 80 percent repetitions. It was found that RT following right guesses, for repetitions and alternations respectively, was faster than RT following wrong guesses under all conditions, thus extending this previously reported finding from the single conditions in which repetitions occurred 50 percent of the time. It was further found that RT to repetitions, for right and wrong guesses respectively, varied indirectly as a function of the objective probability of repetition occurrence; whereas RT to alternations, for right and wrong guesses respectively, was relatively independent of this parameter. A model to explain this latter result, as well as the crossover of the two "right guess" and "wrong guess" functions respectively was examined. It was proposed that RT under the conditions investigated reflects the additive effects of two independent preparatory mechanisms, one dependent on subjective probability and the other on objective probability.

974. Hawkins, H. L., & Underhill, J. R. S-R compatibility and the relative frequency effect in choice reaction time. Journal of Experimental Psychology, 1971, 91, 280-286.

The effects of relative stimulus frequency on choice reaction time (RT) were investigated under two levels of S-R compatibility. Choice RT increased with declining frequency and the magnitude of this increase remained invariant across levels of compatibility when relative frequency was manipulated by varying the frequency imbalance among stimulus alternatives. However, when relative frequency was manipulated by varying the number of equally likely alternatives, the increase in choice RT associated with declining relative frequency was significantly greater under conditions of low, relative to high, compatibility. These findings suggest that the relative frequency effect is produced by two distinctly different mechanisms of anitcipatory bias. One of these functions at stimulus identification and is responsive to stimulus relative frequency, whereas the other functions at response selection and is primarily sensitive to response numerosity.

975. Henderson, D. B., & Greenwald, A. G. Two developmental tests of ideomotor theory. Developmental Psychology, 1971, 4, 484-485.

First-grade, sixth-grade, and college students provided data for two reaction time tasks. Task 1 required rapid naming of digits that were presented either (a) auditorily or (b) visually; Task 2 required rapid naming of visually presented digits that were accompanied simultaneously by an auditory stimulus in the form of (c) the same digit, (d) a different digit, or (e) a click. At all age levels, faster reaction times were obtained for (a) than for (b) in Task 1; for Task 2, reaction times for (c) and (e) were equal, with (d) significantly slower. In accordance with a prediction based on ideomotor theory--the hypothesis that a representation of sensory feedback from an action typically mediates intentional performance of the action--the above differences were reliably greater at the first-grade age level than for older subjects.

976. Henderson, R. L. Remote action potentials at the moment of response in a simple reaction-time situation. Journal of Experimental Psychology, 1952, 44, 238-241.

Action-potential measurements were taken from a nonparticipating body member of a group of 20 Ss responding in a simple reaction-time situation to a visual stimulus. The reaction time was found to decline steadily over a period of six successive practice days of 100 trials each. The action potential during the foreperiod and at the moment of the response was found to decline during the first four days of practice, then to rise on Days 5 and 6. Although the terminal rise in action potential was not statistically significant, a tentative hypothesis was advanced which explains the rise in terms of increased general tension arising from increased motivation to improve as the asymptote of learning is reached.

977. Henriksen, K. F. The effects of false feedback and stimulus intensity upon simple reaction time: An investigation of the variable criterion method. Dissertation Abstracts International (B), 1971, 31, 7628.

978. Henriksen, K. Effects of false feedback and stimulus intensity on simple reaction time. Journal of Experimental Psychology, 1971, 90, 287-292.

To investigate the variable criterion model of stimulus intensity effects, two groups of Ss received three intensities of white noise and were given either fast or slow reaction time (RT) feedback values with respect to a falsely established norm. A third group received no feedback. Both feedback groups evidenced decreased mean RTs and attenuated within-S intensity effects that persisted 24 hr. later. The variable criterion model rendered a verv good fit of the data; feedback effects were interpreted as a lowering of S's decision criterion. To test the "neural noise" hypothesis that effects of preceding-trial stimulus intensity should decrease as ITI increases, three ITI groups of 6.0, 10.0, and 15.0 sec. were included. In short, RT was an increasing function of preceding-trial stimulus intensity; however, the sequence effects were not dependent upon ITI length, as the neural noise hypothesis suggests.

979. Hildreth, J. D. Block's law and a temporal integration model for simple reaction time to light. Dissertation Abstracts International (B), 1971, 32, 3033.

980. Hillyard, S. A. Relationships between the contingent negative variation (CNV) and reaction time. Physiology and Behavior, 1969, 4, 351-357.

In a reaction time (RT) test, ten normal adults made lever presses to tones that were preceded by warning clicks. During the preparatory interval between click and tone, a slow negative potential shift (CNV) was recorded from the scalp. The CNV was partitioned into an artifactual component caused by eye movements and a "true" or tCNV, presumably arising from the brain. Over a long series of lever pressing trials, the trial-to-trial variability in tCNV was inversely correlated with the RT of the motor response in half the subjects. The largest tCNVs preceded responses executed with the fastest RTs. These relationships were complex, and the problem of defining the behavioral correlates of the tCNV was discussed.

981. Hinrichs, J. V., & Craft, J. L. Verbal expectancy and probability in two-choice reaction time. Journal of Experimental Psychology, 1971, 88, 367-371.

The probability effect (PE) in two-choice reaction time was examined across five levels of probability differences between the more frequent and less frequent stimuli: 50-50, 60-40, 70-30, 80-20, and 90-10. In one condition, Ss were required to predict the stimulus presentations. A regression analysis of the prediction condition showed three factors to be significant contributors to the PE: (a) the conditional PE which is observed when Ss' predictions are taken into account, (b) the difference in RT to correct and incorrect stimulus anticipations, and (c) the relative proportion of correct and incorrect stimulus anticipations.

982. Hinrichs, J. V., & Craft, J. L. Stimulus and response factors in discrete choice reaction time. Journal of Experimental Psychology, 1971, 91, 305-309.

Stimulus and response biases in choice reaction time were examined in a three-stimulus, two-response paradigm in which Ss were required to predict stimulus presentations. Four different stimulus frequency distributions were tested in two experiments; Exp. I used a within-S design and Exp. II a between-S design. In both experiments only stimulus bias effects were found with lower frequency differences, but as stimulus frequency differences became more extreme, response biases became more predominant.

983. Hodge, M. H., & Reid, L. S. The influence of similarity between relevant and irrelevant information upon a complex identification task. Perception and Psychophysics, 1971, 10, 193-196.

This experiment sought answers to two questions: (1) Do increases in the similarity between relevant and irrelevant information present in visual stimulus patterns detrimentally influence the performance of a complex identification task, and (2) does the effect of such similarity interact with increasing amounts of irrelevant information? An analysis of the response latencies and errors indicated that identification of the relevant information in the stimulus patterns becomes significantly poorer with increasing similarity between relevant and irrelevant information and with increasing amounts of irrelevancy. The results also showed that the joint effect of similarity and irrelevancy produces a greater performance decrement than that associated with either variable alone. Practice on the task reduced the detrimental effects.

984. Ingling, N. W. Categorization in visual information processing. Dissertation Abstracts International (B), 1971, 32, 3666-3667.

J

985. Jennings, J. R., Averill, J. R., Opton, E. M., & Lazarus, R. S. Some parameters of heart rate change: Perceptual versus motor task requirements, noxiousness, and uncertainty. Psychophysiology, 1971, 7, 194-212.

Sensory-motor integration and physiological patterns were investigated in a modified reaction time task. Following a READY signal, one of two DISCRIMINATIVE signals indicated that a right or left reaction was to be made to a GO signal. For one group, the DISCRIMINATIVE and GO signals occurred simultaneously: for another group, the GO signal was delayed 10 sec. In different sessions, shock occurred with the DISCRIMINATIVE signal on 0%, 33%, or 100% of the trials. The basic pattern of heart rate response was the same in all conditions, namely, acceleration followed by deceleration immediately prior to the DISCRIMINATIVE and GO signals. All experimental manipulations appeared to contribute to cardiac deceleration; for example, the greatest decrease occurred prior to the simultaneous DISCRIMINATIVE-GO signal with 33% shock probability. The least deceleration (and fastest reaction times) occurred to the delayed GO signal. Anticipation of a motor response and or shock also accentuated the accelerative limb of the heart rate curve, as well as producing increased skin conductance. Muscle action potentials from the chin showed an equivocal relationship to cardiac acceleration (or less deceleration) and to faster reaction times. Results are discussed in terms of an attentional hypothesis, and their relevance to speculations by Lacey and Obrist is examined.

986. Johansson, G., & Rumar, K. Drivers' brake reaction times. Human Factors, 1971, 13, 23-27.

The object of this investigation was to determine the distribution of brake reaction times which can be expected from drivers who have to brake suddenly and completely unexpectedly in traffic situations. The experiments were carried out as follows:

1. Brake reaction time was measured on a large group of drivers (321) in an anticipated situation on the road (Brake reaction time 1).

2. A small group of drivers (5) was repeatedly tested in the same way (Brake reaction time 2).

3. The same small group was repeatedly tested in a surprise situation (Brake reaction time 3).

4. The ratio of brake reaction time 3 to brake reaction time 2 was used as a correction factor and applied to brake reaction time 1.

The corrected median of the resulting distribution was 0.9 sec.; 25% of the group was estimated to have a brake reaction time longer than 1.2 sec.

987. Joubert, C. E., & Baumeister, A. A. Effects of varying the length and frequency of response-stimulus interval on the reaction times of normal and mentally deficient subjects. Journal of Comparative and Physiological Psychology, 1970, 73, 105-110.

Reaction times to the second of two closely spaced reaction stimuli were found to be dependent on the interaction of length of the interval between the first response and the onset of the second stimulus ($R_1 - S_2$) and form of $R_1 - S_2$ interval distribution. Five $R_1 - S_2$ intervals were presented under three distributions: skewed left, skewed right, and symmetrical. In addition, two preparatory intervals (PI) were presented. Retarded subjects performed poorer than normal subjects on all measures; in addition, they were particularly handicapped with short $R_1 - S_2$ intervals. Improved performance on the short $R_1 - S_2$ intervals was found with increased frequency of these intervals. Relatively fast reactions (R_2) were associated with shorter PIs and there was a significant interaction between $R_1 - S_2$ interval and PI. These results were taken as support for an expectancy interpretation of the psychological refractory period.

988. Juola, J. F., Fischler, I., Wood, C. T., & Atkinson, R. C. Recognition time for information stored in long-term memory. Perception & Psychophysics, 1971, 10, 8-18.

Two experiments were performed to determine the effects of number of words in a target set (varying from 10 to 26) and the nature of distractor words on the latency of both positive and negative recognition responses. Before the test phase, S memorized a list of words and then was tested with a series of single words. To each presentation S made a positive or negative response to indicate whether or not the word was a member of the memorized target list. Response latency was observed to be an increasing function of memory list length. Negative response latency also was greater if distractor words were visually or semantically similar to specific target words. The results were analyzed in terms of a modified signal detection model. It is assumed that S makes a subjective judgment of the familiarity of a test item and on that basis, decides either to respond immediately or to delay the response until a search of the memorized list can be executed. Several different models of the search process are considered and evaluated against latency measures and error data.

K

989. Kagan, H. Muscular tension, task resistance and speed of response. Psychological Record, 1964, 14, 417-425.

The effect of induced tension (IT) and response resistance (RR) on reaction time (RT) was investigated by subjecting two highly trained Ss to many weeks of trials, employing a wide range of (IT's) and (RR's). The results were individually computed by an analysis of variance technique. The results show that (IT) has a detrimental effect on RT when relatively high (RR's) are employed, but has no detrimental effect when relatively low (RR's) are employed. Under any (IT) level, RT is directly proportional to (RR). The results suggest that induced tension is superfluous to already existing muscular tension created by "set," except when the (RR) cannot be discriminated from 0 resistance.

990. Kantowitz, B. H. Information versus structure as determinants of pattern conception. Journal of Experimental Psychology, 1971, 89, 282-292.

Two finite-state grammars (structures) were used to generate sets of letter strings having equal informational value. After Ss learned five, three-item blocks from a structure, a SAME—DIFFERENT recognition test composed of equal numbers of strings from each structure showed significant discrimination between structures. This discrimination was not improved on a second recognition test when Ss were informed of the origin of DIFFERENT as well as SAME items. Interpolation of a learning phase between the two recognition tests caused a decrement on the second recognition test. While trial-by-trial feedback improved overall performance, it did not facilitate performance on the second recognition test relative to the first recognition test. When information was varied by substituting randomly generated strings for one set of constrained strings, discrimination did not improve. Recognition performance was unaffected by information in the distractor items. Recognition following the learning of random strings was at a chance level. These results fail to support explanations of pattern conception which are based upon the information metric. The locus of constraint facilitation was tentatively placed in a storage mechanism, and comparisons with storage of meaningful material were discussed.

991. Karlin, L., Martz, M. J., Brauth, S. E., & Mordkoff, A. M. Auditory evoked potentials, motor potentials and reaction time. Electroencephalography and Clinical Neurophysiology, 1971, 31, 129-136.

Evoked potentials from simple and choice reaction time (RT) tasks were determined separately for trials in the fast, middle and slow thirds of the RT distributions. We found that those trials with faster RT also produced a more negative N1 peak, less negative peak at N2 and N3 and more positive peaks at P3 and P4; the choice task also produced significantly larger deflections at N1 and P3 than did the simple task. In the choice RT condition, the stimuli that did not require a motor response (S–) yielded a P3 deflection slightly greater than that produced by the response stimuli (S+) in the fast third of the RT distribution, whereas the S– stimuli produced an N1 deflection approximately equal to the corresponding deflection produced by S+ in the middle third of the RT distribution. This difference between N1 and P3 was interpreted to mean that they were partially independent in that the amplitudes of both deflections were influenced by changes in background arousal, whereas only P3 was influenced by a reactive factor. Various types of analyses suggested that response timing and previously hypothesized response-related potentials could not have been responsible for any of the results obtained.

992. Katz, L., & Wicklund, D. A. Word scanning rate for good and poor readers. Journal of Educational Psychology, 1971, 62, 138-140.

Twenty fifth-grade poor readers and 19 good readers were presented with a series of trials on each of which two successive slides were shown. The first slide contained a single word. The second slide contained either two or three words which comprised either (a) a grammatical, meaningful sentence or (b) a scrambled version of a grammatical sentence. The subjects were instructed to respond "yes" or "no" depending on whether the first slide word did or did not appear on the second slide. Although poor readers were about 250 milliseconds slower overall than good readers, both groups had equivalent scanning rates. Reaction time to the three-word sentences was about 100 milliseconds slower than reaction time to the two-word sentences, for both groups. The absence of effects due to grammaticality and the absence of an interaction between sentence length and "yes" versus "no" suggested that subjects in both groups used a rapid exhaustive perceptual scan. The differences observed between good and poor readers cannot be caused by differences in the transformation and matching process.

993. Katz, L., & Wicklund, D. A. Simple reaction time for good and poor readers in grades two and six. Perceptual and Motor Skills, 1971, 32, 270.

994. Katzman, N. I. The effects of uncertainty and choice points on cognitive processing. Dissertation Abstracts International (B), 1971, 31, 6939.

995. Kemp, B. J. Simple auditory reaction time of young adult and elderly subjects in relation to perceptual deprivation and signal-on versus signal-off conditions. Dissertation Abstracts International (B), 1971, 32, 1243.

996. Kincaid, J. P. Information processing in active and long term memory. Dissertation Abstracts International (B), 1971, 32, 1878.

997. Klapp, S. T. Implicit speech inferred from response latencies in same-different decisions. Journal of Experimental Psychology, 1971, 91, 262-267.

When Ss read numbers or words aloud, the latency from stimulus onset to the initial vocalization depends upon the number of syllables to be pronounced. The present experiments showed that response latency also depends on syllables for same–different decisions, thereby suggesting that the effect of syllables operates during stimulus recognition rather than during preparation for overt vocalization. The interpretation was that a central process, preparatory for and more rapid than overt speech, is involved in comprehension of written language symbols.

998. Klatzky, R. L., Juola, J. F., & Atkinson, R. C. Test stimulus representation and experimental context effects in memory scanning. Journal of Experimental Psychology, 1971, 87, 281-288.

The Ss performed a memory-scanning task in which they indicated whether or not a given test stimulus (letter or picture) matched one of a previously memorized set of letters. The test stimuli presented during a given session were either exclusively letters (a letter session), exclusively pictures (a picture session), or a random sequence of both (a mixed session). Reaction-time functions relating response latency to the size of the memorized set of letters were plotted, and the data are discussed in the context of the scanning models previously proposed by S. Sternberg. The reaction time functions of letter sessions and picture sessions were found to be consistent with the exhaustive model for memory scanning. However, the functions for mixed sessions deviated markedly from the predictions of such a model. The context in which a scanning task is imbedded appears to have a substantial effect on reaction time functions.

999. Kohfeld, D. L. Simple reaction time as a function of stimulus intensity in decibels of light and sound. Journal of Experimental Psychology, 1971, 88, 251-257.

Two experiments were conducted in which simple auditory and simple visual reaction time (RTs) were compared on the same scale by presenting psychophysically equivalent response signals. In Exp. I, mean RT for both auditory and visual signals at 90 db. and 60 db. was the same; for the 30-db. comparison, RT was longer for the visual than for the auditory signal. Exp. II indicated that the light-tone difference at 30 db. was attributable to latency differences between reception at photopic and scotopic visual levels. In view of these results, the common assumption that auditory RT is shorter than visual RT was reconsidered.

1000. Kraft, T. R. Choice reaction time as a function of the internal/external personality construct, skill/chance instructional set, and reinforcement value. Dissertation Abstracts International (B), 1971, 31, 6877.

1001. Krueger, L. E. Visual comparison in a redundant display. Cognitive Psychology, 1970, 1, 341-357.

The Ss saw a target letter centered immediately above a six-letter word or nonword (scrambled collection of letters), and indicated whether the word or nonword contained the target. The Ss responded faster for words than for nonwords. The time savings for words persisted when a replica of the target letter was placed adjacent to each letter in the six-letter item—but only when the item was arrayed horizontally, and not when it was arrayed vertically. Similar time savings for words were obtained when, instead of presenting the target letter and six-letter item simultaneously (visual comparison), the target letter was shown immediately before (visual search) or immediately after (memory search) the six-letter item.

L

1002. LaBerge, D. Effect of type of catch trial upon generalization gradients of reaction time. Journal of Experimental Psychology, 1971, 87, 225-228

Generalization gradients of tones were obtained with a Donders type c reaction under conditions in which the catch stimulus was a tone of neighboring frequency, a tone of distant frequency, white noise, a color, or nothing. When the catch stimulus was another tone, the latency gradients were steep, indicating strong control of responding by a frequency discrimination process. When the catch stimulus was a red light or nothing, the gradients were flat, and displaced downward, indicating that responding was being controlled by an early detection process.

1003. LaBerge, D. On the processing of simple visual and auditory stimuli at distinct levels. Perception and Psychophysics, 1971, 9, 331-334.

Two RT studies explored the possibility that identification of a single stimulus can take place through more than one perceptual route. In the first experiment, mean RT to color was systematically changed by varying type of catch stimulus. In the second experiment, the form of the RT distribution to a tone was changed by varying type of catch stimulus. Considerations of distribution means and shapes led to the conclusion that detection and discrimination are two of the alternative levels of perceptual processing which can be evoked in rapid identification of these stimuli.

1004. Lance, B. M., & Chaffin, D. B. The effect of prior muscle exertions on simple movements. Human Factors, 1971, 13, 355-361.

Simple discrete arm movements were studied before and after muscle exertion. Results showed that fatiguing muscle exertions do not seem to alter the speed of initiation of responses but do alter movement time, particularly for movement associated with final corrective action.

1005. Landauer, T. K., & Freedman, J. L. Information retrieval from long-term memory: Category size and recognition time. Journal of Verbal Learning and Verbal Behavior, 1968, 7, 291-295.

The Ss were shown single common English words and identified them as belonging or not belonging to well-known verbal categories. Each target word was identified with respect to two categories, one of which included the other by definition and was, therefore, necessarily the larger of the two. Two experiments using a variety of different nested verbal categories and two somewhat different methods produced similar results: the average time required for category recognition was greater for larger than for smaller categories.

1006. Lappin, J. S., Snyder, C. R., & Blackburn, C. The encoding of perceptual information in the organization of individual stimulus patterns. Perception and Psychophysics, 1971, 10, 123-128.

Two experiments compared the effectiveness of variable physical dimensions and relationships among the components of individual stimulus patterns as means for encoding perceptual information. Four different codes were constructed in which letters (A through P) were represented by redundant combinations of the shape and brightness of the four component forms in each stimulus pattern. Three of the codes differed in terms of the physical variables that were redundant, and a fourth code was designed to simplify the relationships within individual stimulus patterns. Ss were asked to identify each pattern by naming its letter label as rapidly as possible. Differences in the speed of identification between codes and between individual patterns within codes indicated that perceptual information was effectively encoded by the organization of relationships within individual stimulus patterns. The representation of stimulation in terms of relationships among components has several implications for models of human information processing.

1007. Larimer, J. O. Reaction time: A similarity analysis. Dissertations Abstracts International (B), 1971, 31, 6295.

1008. Lefcourt, H. M., & Siegel, J. M. Reaction-time behaviour as a function of internal-external control of reinforcement and control of test administration. Canadian Journal of Behavioural Science, 1970, 2, 253-266.

Two large samples were tested in self- versus experimenter-controlled reaction-time experiments. Ss with internal versus external control of reinforcement expectancies were compared across these conditions. Internal-external proved to be irrelevant to condition effects, whereas sex of S proved important. Female Ss were quicker in self-directed conditions in both regular and irregular reaction-time procedures, while always slower than males in general. When instructions were embellished to facilitate performance for a third sample, external Ss did show some improvement. The data indicated support for previous research that has emphasized responsiveness of external Ss to experimenter's structuring of tasks. External Ss seemed more affected by motivating directions especially in the other-directed condition, at the shortest preparatory interval. No clear-cut support, however, was found for the hypothesized interaction between internal-external and self- versus other-controlled conditions.

1009. Lefcourt, H. M., & Siegel, J. M. Reaction time performance as a function of field dependence and autonomy in test administration. Journal of Abnormal Psychology, 1970, 76, 475-481.

The effects of self- versus E administration of reaction time tasks upon field-independent and field-dependent Ss were observed with both regular and irregular procedures. It was predicted that the more autonomous, self-directed condition would be favored by field-independent Ss, whereas E-controlled conditions would be preferred by field-dependent Ss. The results provide some support for these hypotheses in the male sample. Female Ss produced a different pattern of results, suggesting that field dependence may have different implications for female as opposed to male samples.

1010. Levis, D. J., & Warehime, R. G. Effects of primary and secondary aversive motivation on finger-withdrawal reaction time responses. Journal of Experimental Psychology, 1971, 89, 126-131.

The pairing of a reaction time signal with electric shock in the context of a delayed avoidance conditioning paradigm resulted in faster response latencies and more avoidance responding than instructions only to respond as quickly as possible. This effect does not appear to be dependent upon the informational value of shock since a group of Ss receiving the word "wrong" as the UCS also responded significantly slower than the signal-shock group. A shock control group, in which shock was never paired with the reaction time signal, responded slower than each of the above three groups. The effects of the signal-shock group persisted for at least the first 20 extinction trials. Scores on three personality inventories did not separate Ss on the dependent measures analyzed. It was concluded that conditioned anxiety played a significant motivational role in producing the faster latencies.

1011. Libby, W. L., Jr. Reaction time and remote association in talented male adolescents. Developmental Psychology, 1970, 3, 285-297.

In the same highly talented adolescent population which yielded remarkable findings for Getzels and Jackson, for Grim, Kohlberg, and White, and for Grim, differences were found between good remote associators and poor remote associators on an irregular reaction time (RT) task in which a stimulus is preceded at various preparatory intervals by a warning. These differences were related to a model of the remote associational process postulating fluctuations of attention among three states: (a) attention to a broad range of environmental information, (b) focus on task-relevant external cues, and (c) attention inward. As predicted, good remote associators had more variable RTs and were more responsive to irrelevant cues provided by the previous preparatory interval. Differences between good and poor remote associators were traced to short and long preparatory intervals, respectively, suggesting that good remote associators, somewhat like schizophrenics, have difficulty establishing an initial set to respond quickly while poor remote associators have more difficulty maintaining an established set.

1012. Link, S. W. Applying RT deadlines to discrimination reaction time. Psychonomic Science, 1971, 25, 355-358.

Five Ss discriminating differences between a fixed standard line length and five comparison line lengths performed under three randomly presented RT deadlines. Analyses of response measures, conditional upon the RT deadline of a preceding trial, showed that on a trial-to-trial basis, S could shift both accuracy and RT performance to meet the demands of a new RT deadline. There was no influence of the RT deadline used on Trial n − 1 on performance on Trial n.

1013. Link, S. W., & Tindall, A. D. Speed and accuracy in comparative judgments of line lengths. Perception and Psychophysics, 1971, 9, 284-288.

The paper presents an extension of Henmon's (1906) finding that RT decreases as the difficulty of discriminating a difference between two line segments decreases. It is shown that, when an E RT deadline is imposed on the experimental task, RT remains constant with respect to changes in discrimination difficulty, but that correct response probability increases with increasing difference between two line segments. The data are examined in terms of current theories for the speed-accuracy trade-off.

1014. Lit, A. Illumination effects on depth discrimination. The Optometric Weekly, 1968, 59, 42-55.

1015. Lit, A., Young, R. H., & Shaffer, M. Simple time reaction as a function of luminance for various wavelengths. Perception and Psychophysics, 1971, 10, 397-399.

Reaction time to white and colored targets was measured on two Ss for stimuli presented over a wide range of scotopic and photopic retinal illuminance levels. The colored targets were each photometrically matched for brightness against a white standard target at one photopic level (1.00 log td). The data show that for both the white and colored stimuli, reaction time is long at low target illuminations and progressively decreases to approach a final asymptotic value as the illumination level is increased. Discontinuities in the experimental curves relating reaction time and retinal illuminance occur at about −1.00 log td for all colors except red, in accordance with predictions based on the duplicity theory of vision. The photopic (cone) segments of the experimental curves overlap, while the scotopic (rod) segments are laterally displaced to progressively lower retinal-illuminance values as target wavelength is decreased, in accordance with expectations based on the differences in the luminosity functions of the scotopic and photopic systems.

1016. Loockerman, W. D. The relationship between hand and total body simple and choice reaction and movement times. Dissertation Abstracts International (B), 1971, 32, 1245.

1017. Loockerman, W. D., & Berger, R. A. Accuracy of predicting reaction and movement time of a gross motor performance from the dominant hand under simple and choice stimulus conditions. Perceptual and Motor Skills, 1971, 33, 1326.

1018. Lovelace, E. A., & Snodgrass, R. D. Decision times for alphabetic order of letter pairs. Journal of Experimental Psychology, 1971, 88, 258-264.

Three experiments were conducted in which Ss had to indicate by a binary motor response whether a pair of letters was in proper or reversed alphabetic order. The times required to make such decisions were (a) shorter with greater separation of the two letters in the alphabet, (b) shorter for letter pairs in proper order than for reversed pairs, and (c) more affected by order of the pair at small than at large separations. Decision times were also systematically related to position of the letters in the alphabet, times generally increasing from the beginning to the end of the alphabet.

1019. Lyons, J. L., & Briggs, G. E. Speed-accuracy trade-off with different types of stimuli. Journal of Experimental Psychology, 1971, 91, 115-119.

In a stimulus-classification task, linear functions relating reaction time to central processing uncertainty were obtained under four conditions: high versus low accuracy, with letters or random figures as stimuli. The intercepts (not the slope constants) varied with accuracy level, while the slopes (not the intercepts) varied with stimulus material. This suggests that stimulus sampling rate is independent of stimulus familiarity but that central processing (stimulus classification) is slower for the less familiar stimuli.

M

1020. McAdam, D. W., Knott, J. R., & Rebert, C. S. Cortical slow potential changes in man related to interstimulus interval and to pre-trial prediction of interstimulus interval. Psychophysiology, 1969, 5, 349-358.

Two experiments were performed to explore further the relationship between the cortical slow potential change known as the "contingent negative variation" (CNV) and the concept of "expectancy."

In Experiment I, 24 male Ss were presented click pairs, with inter-click intervals of 800, 1600 and 4800 msec (2 blocks of 10 trials each, counterbalanced between Ss for order), and instructed to press a key after the second click. Interval by order by trials analysis of variance showed interval to be the only significant factor: CNVs were lower and RTs longer as interval increased.

In Experiment II, 8 female Ss given 60 pairs of clicks, 30 each with separations of 1200 and 2400 msec, were instructed to respond as in Experiment I, and were asked to make a pretrial prediction of the interval they would next receive. Analysis of variance of RTs showed that Ss responded slower when the interval was other than that predicted. Prediction by reception by subjects analysis of variance of CNV amplitude at the 1200 msec point gave a significant F only for prediction, mean amplitude for short being higher than for long. A similar design applied to CNV amplitudes at both the 1200 and 2400 msec points when Ss received the long interval yielded a significant measurement point by interval predicted interaction; at the 1200 msec point, short predictions were followed by higher CNVs than were long predictions; at 2400 msec, the opposite was found.

These data combine with those already in the literature to indicate that the relationship between "expectancy" and the CNV is far from simple, and that cognitive and motivational factors play a significant role in determining CNV amplitude.

1021. McDonnell, P. M. The role of albedo and contrast in a test of selective attention. Perception and Psychophysics, 1970, 8, 270-272.

The operation of a selective process was demonstrated under conditions that eliminated exploratory behavior, receptor adjustments, and that could not be construed as abstraction. Ss were given a choice reaction-time test to tachistoscopically exposed stimuli. There were three conditions of brightness and contrast. Four targets equally spaced in brightness units were presented either on a black, a medium gray, or a white background. If a selective process was found to operate, it was hoped to separate the effects of albedo and contrast as factors determining priority in selection. The results confirmed that Ss chose the stimuli of highest contrast, but in the event that contrast was equivalent for two stimuli, the target of highest albedo was chosen significantly more often.

1022. McKeever, W. F., & Huling, M. D. A note on Filbey and Gazzaniga's "Splitting the brain with reaction time." Psychonomic Science, 1971, 22, 222.

1023. Meyers, W. J. Heart rate fluctuations and fixed foreperiod reaction time. Psychophysiology, 1966, 3, 40-45.

Visual reaction times were recorded in a fixed foreperiod situation, to study the relation between sensorimotor performance and heart rate measures. With 42 male college students as Ss, both resting and performance levels of heart rate and heart rate fluctuations were obtained. Reaction time data were collected from blocks of trials at given foreperiods which ranged from 1 to 9 sec. Three groups of subjects, formed on the basis of high, medium, and low levels of peak-trough differences in heart rate during the reaction-time trials, showed different foreperiod functions. The hypothesis that fluctuations in heart rate are related to fixed foreperiod reaction time performance was supported.

1024. Miller, J. M., Moody, D. B., & Stebbins, W. C. Evoked potentials and auditory reaction time in monkeys. Science, 1969, 163, 592-594.

Monkeys with bipolar stimulating and recording electrodes in primary auditory cortex were trained to release a key to the onset of a pure tone. Substitution of direct cortical stimulation for the pure tone resulted in a reduction of 15 milliseconds in the latency of the behavioral response. This changed latency agreed with the latency of the primary evoked potential recorded from the animals. Systematic related changes in the amplitude of the central response and in the latency of the behavioral response followed changes in the intensity and frequency of the acoustic stimulus.

1025. Morgenstern, F. S., Haskell, S. H., & Waters, P. D. Distributive reaction times in single and multiple response units. Ergonomics, 1971, 14, 219-230.

The concern of these experiments was with the properties of response units to a simple stimulus, presented in the visual or auditory mode. It was found that the RT for a given letter is affected by the organization of the response unit by its position and by the size of the response unit. The RTs for all items in response units were affected by the modality; RTs to visually presented stimuli were slower at all positions in the response units. The frequency of errors in the auditory series was almost twice that of the visual series. There was no consistent carry over of practice with one response unit to another made up of a smaller or larger number of items.

In each facet of the investigation, therefore, there was a strong indication that there is a higher order of motor response integration in which a number of responses become organized into units which have characteristics of their own.

1026. Morin, R. E., DeRosa, D. V., & Ulm, R. Short-term recognition memory for spatially isolated items. Psychonomic Science, 1967, 9, 617-618.

With from three to six digits presented prior to a recognition probe, the only evidence for a von Restorff effect existed in faster reaction times to probes of the isolated stimulus with sets of size 6.

1027. Morin, R. E., Hoving, K. L.. & Konick, D. S. Are these two stimuli from the same set? Response times of children and adults with familiar and arbitrary sets. Journal of Experimental Child Psychology, 1970, 10, 308-318.

When fourth-grade children and adults decide whether two stimuli are from the same or different sets, reaction time data suggest that the Ss use an encodng strategy if the sets have familiar names and a search strategy if the sets are arbitrarily grouped elements. Kindergarten Ss show some signs of encoding, but also exhibit behavior suggestive of deficiencies in mediation and rehearsal, and a dependence on visual cues.

1028. Morrell, L. K., & Morrell, F. Evoked potentials and reaction times: A study of intraindividual variability. Electroencephalography and Clinical Neurophysiology, 1966, 20, 567-575.

Experiments with six normal adults were undertaken in order to study the relationship between intra-individual variability in simple reaction time and photically evoked potentials. It was found that the amplitudes of prominent components of the evoked response (both early and late) are correlated with the reaction time to the photic signal. The result was found for occipital, central vertex, and right and left Rolandic regions. Latency to peak or trough of various wave components had no consistent relationship to RT. Such factors as selective attention and fluctuations of alertness are discussed as possible determinants of the relationship between RT and amplitude of averaged evoked potentials.

1029. Morris, C. J. Electroencephalographic and evoked potential correlates of reaction time and visual discrimination performance. Psychonomic Science, 1971, 23, 193-195.

Electroencephalographic (EEG) and evoked cortical potential (ECP) measures of arousal were found to be related to level of performance on a reaction time and visual discrimination task. ECP measures were more strongly associated with performance on both tasks than any of the EEG measures. However, the very weak association between arousal measures and visual discrimination performance suggested that arousal plays a limited role in the control of complex decision processes.

1030. Mulhern, T. J. A study of the reaction times of normals and retardates as a function of stimulus-response compatibility and complexity. Dissertation Abstracts International (B), 1971, 31, 6264.

1031. Mulhern, T., & Baumeister, A. A. Effects of stimulus-response compatibility and complexity upon reaction times of normals and retardates. Journal of Comparative and Physiological Psychology, 1971, 75, 459-463.

The reaction times of normal and retarded subjects were compared across five levels of complexity and two of stimulus-response compatibility. Stimulus complexity was varied between subjects and S-R compatibility within subjects. The main effects of intelligence, complexity, and compatibility were all significant as were the Intelligence X Complexity, Complexity X Compatibility, and Intelligence X Compatibility interactions. The results were discussed in terms of an information-processing deficit for the retardates.

N

1032. Näätänen, R. The diminishing time – uncertainty with the lapse of time after the warning signal in reaction – time experiments with varying fore-periods. Acta Psychologica, 1970, 34, 399-418.

The author deals with the problem as to why the shortest anticipatory, or 'fore'-periods in a randomized series of such periods of different durations usually yield the longest reaction times, whereas the fastest reaction times are experienced with the shortest (to a certain limit) fore-periods when the fore-period is maintained constant within each set of trials. A proposed explanation is examined, one based on the increasing probability of delivery of the stimulus with the passage of time following the warning signal in experiments conducted with randomized fore periods of different durations.

This explanation is tested with 13 subjects (each participating twice). It is found that when the factor of increasing probability is eliminated, the shortest fore-periods in the series no longer yield the longest reaction times. The conclusion is drawn that the main reason for the diverging tendencies noted is the information-generating nature of the passage of time following the warning signal in reaction time experiments with randomized fore-periods of different durations.

Finally, four factors are proposed as exerting an influence on the relationship between the fore-period and the reaction time when varying fore-periods are delivered in random order following a rectangular distribution of fore-periods.

1033. Näätänen, R. Non-aging fore-periods and simple reaction time. Acta Psychologica, 1971, 35, 316-327.

This study deals with the relationship between the momentary objective probability of the delivery of a stimulus and the reaction time in a simple reaction-time task. The hypothesis was that the reaction time is closely related to the objective probability via expectancy i.e., the momentary probability of the delivery of the stimulus as experienced by the subject. This problem was experimentally approached from two directions: (1) by varying the objective probability, in which case the reaction times should change inversely with the objective probability, and (2) by keeping the objective probability constant (by using the Bernoulli process), in which case the reaction times should not change. Eight male subjects were used. The first assumption proved to be correct, whereas the second held only when certain mean inter-stimulus intervals were used.

Finally, the status of the expectancy concept as an explanatory variable in the relationship between the fore-period and the reaction time was discussed, with emphasis on the need for some other explanatory concepts, which were proposed.

1034. Namba, S., Yoshikawa, T., & Yasuda, S. The anchor effects on the judgment of loudness using reaction time as an index of loudness. Perception and Psychophysics, 1972, 11, 56-60.

The present study was designed to investigate anchor effects on loudness judgments, using reaction time (RT) as an index of loudness. In Experiment 1, anchor effects were reexamined using verbal categories. Two kinds of anchor stimuli, 60- and 90-dB SPL 1,000-Hz pure tones, and four kinds of series stimuli, 60-, 70-, 80-, and 90-dB tones, were used. In this experiment, clear anchor effects were found just the same as in our previous experiment. Experiment 2 was conducted using RT as an index of loudness with stimulus conditions similar to those in Experiment 1. The same anchor effects could be seen in this experiment too. As RT is quite free from the limitations inevitably accompanying the verbal responses, it may be concluded that the anchor effects reflect the shift in perception.

1035. Nickerson, R. S. 'Same'-'different' response times: A further test of a 'counter and clock' model. Acta Psychologica, 1971, 35, 112-127.

Three experiments were conducted for the purpose of evaluating further a model that was described in a previous paper (Nickerson, 1969). The model was intended to be applied to situations in which 'same'-'different' judgments must be made with respect to stimuli that are allowed to differ only on a single perceptual dimension. In a previous experiment, the model had been tested in a situation in which the magnitude of the difference between different stimuli was constant over an experimental run. The purpose of experiments 1 and 2 of the present series was to extend the model to the situation in which differences of several magnitudes are used within the same session. The main implication of the model for this case is the following: Whereas 'different' response times (RT) should decrease with increases in the magnitude of the difference between stimuli, (incorrect) 'same' RTs should be relatively insensitive to this variable. The results were generally consistent with this expectation.

In experiment 3, a Donders' c-type task was used in the hope of simplifying the situation, thereby getting a somewhat purer measure of the time required to make the 'same' or 'different' decision. Contrary to expectations, response times were generally longer in this case than in the preceding experiments. It was suggested that the general increase in response times might have been due to the occurrence of revised or 'second-thought' decisions, which the Donders' c-type task permits. This conjecture was made the more plausible by the fact that under both 'respond-to-same-only' and 'respond-to-different-only' conditions, errors of commission were about three times as frequent as were errors of omission. Although the possibility of the occurrence of revised decisions makes the model less appropriate for the c- than for the b-type task, most (but not all) of the predictions that were developed with the latter task in mind were in fact obtained in this experiment.

1036. Nishisato, S. Reaction time as a function of arousal and anxiety. Psychonomic Science, 1966, 6, 157-158.

In a visual discrimination task the S's momentary arousal, reflected by spontaneous changes in skin potential (GSR), contributed significantly to the intra-individual fluctuation of reaction time; chronic anxiety level, measured by an inventory scale, contributed significantly to inter-individual fluctuation. Both high anxiety and arousal were associated with longer reaction time. The present negative relation between response speed and GSR arousal and the previously reported positive relation between response speed and EEG desynchronization may result from different phases of arousal.

1037. Norton, J. C. The effect of set size, age, and mode of stimulus presentation on information processing speed. Dissertation Abstracts International (B), 1971, 31, 5670.

1038. Novik, N., & Katz, L. High-speed visual scanning of words and nonwords. Journal of Experimental Psychology, 1971, 91, 350-353.

Letter scanning rates were compared for words and nonwords. In Exp. I, mixed stimulus lists for words and nonwords were presented. In Exp. II, Ss received either words or nonwords. In both experiments, Ss scanned words faster than nonwords. The results suggested sequential, exhaustive scanning.

1039. Nowlin, J. B., Eisdorfer, C., Whalen, R., & Troyer, W. G. The effect of exogenous changes in heart rate and rhythm upon reaction time performance. Psychophysiology, 1970, 7, 186-193.

The influence of different heart rates and rhythm on reaction time performance was examined in two groups of experimental subjects, heart rate in one group being varied by atrial pacing and in the other group by ventricular pacing. A mixed preparatory interval series of visual reaction time trials was employed, with preparatory interval durations of 3, 4, and 5 sec. Study 1 subjects, exposed to atrial pacing in a cardiac catheterization laboratory immediately before coronary artery cineangiography, demonstrated no change in reaction time response with the pacing situation when heart rate was 115 beats per minute (bpm). Response speed was most rapid with the 5 sec preparatory interval, slowest with the exposure to an exogenously-induced tachycardia. Presentation first of a variable paced tachycardia following a regular tachycardia was associated with slightly prolonged times in both situations, as compared to reaction time produced with the reverse order of pacing presentation. These differences were not statistically significant. Presence or absence of cineangiographic evidence or coronary arteriosclerosis within Study 1 exerted no effect on reaction time performance. Study 2 individuals, paced with an external (Chardack) pacemaker in a quiet laboratory environment, confirmed the results obtained from Study 1. These data would suggest that the level of background heart rate is unimportant as a determinant of reaction time response.

O

1040. Obrist, P. A., Webb, R. A., & Sutterer, J. R. Cardiac deceleration and reaction time: An evaluation of two hypotheses. Psychophysiology, 1970, 6, 695-706.

The purpose of this experiment was to evaluate two hypotheses concerning the basis of the association between performance on a simple reaction time (RT) task and the deceleration of heart rate found as the S responds. The RT task consisted of 96 trials in which the foreperiod was randomly varied between 2, 4, 8, and 16 sec. Two groups of 31 Ss each were used, with the cardiac response blocked pharmacologically in one group, in order to determine if the occurrence of the cardiac response facilitated performance through an afferent feedback mechanism. Two aspects of somatic activity, EMG bursts from chin muscles and eye movements and blinks, were also assessed in order to determine if the cardiac response and the associated behavioral facilitative effects were linked to a common mediating process involving cardiac deceleration and the inhibition of ongoing, task-irrelevant somatic activities. The latter hypothesis was consistently supported. Blocking the cardiac response did not significantly influence performance. However, a within-S analysis revealed a pronounced direct relationship between RT and the magnitude of the inhibition of somatic effects and the magnitude of the cardiac deceleration when the latter was not blocked pharmacologically. These data along with several other lines of evidence are considered to indicate that heart rate deceleration may not be significantly involved in an afferent mechanism but rather can be best understood as a peripheral manifestation of central processes.

1041. Orr, W. C., & Stern, J. A. The relationship between stimulus information, reaction time, and cortical habituation. Psychophysiology, 1971, 7, 475-484.

This investigation was an attempt to study systematically the effects of uncertainty, or stimulus information, on habituation rate. Subjects were randomly assigned to one of three conditions varying in uncertainty. EEG alpha desynchrony duration, electrodermal conductance change, and reaction time were the dependent measures. The results showed uncertainty to have no significant effect on any of the neurophysiological measures. There was a significant effect on the reaction time measure. There was no significant correlation between the EEG and electrodermal response measures, nor was there any correlation between either of these measures and reaction time. Results indicated that habituation could occur in the presence of cortical and behavioral arousal. It was concluded that information may be most meaningfully measured behaviorally and that habituation parameters are dependent upon the physiological system being measured.

P

1042. Parkman, J. M. Temporal aspects of digit and letter inequality judgments. Journal of Experimental Psychology, 1971, 91, 191-205.

The time needed for adults to indicate which of two digits is larger, which of two digits is smaller, and which of two letters appears later in the alphabet was studied in three experiments. Latencies in both digit tasks were primarily a linear increasing function of the minimum digit of each pair, with responses for indicating the larger digit approximately 40 msec. faster than those for indicating the smaller digit. Latencies for the letter task were approximately 200-300 msec. longer than the reaction times for digits. Furthermore, the pattern of latencies for individual letter pairs was substantially different from the patterns for corresponding digit pairs, suggesting underlying process differences for the two types of material.

1043. Parkman, J. M., & Groen, G. J. Temporal aspects of simple addition and comparison. Journal of Experimental Psychology, 1971, 89, 335-342.

For five sessions, six college students were shown series of simple addition problems of the form p + q = nn and were asked to respond rapidly whether the solution given with each problem (nn) was correct or not. On half of the trials, the presented solution equalled the true sum, and on the remaining trials, the presented solution differed from the true sum by not more than two. Additive addition-stage and comparison-stage reaction time effects were found for correct responses. For the addition stage, latencies were found to increase linearly as a function of the minimum addend and also as a function of the sum. For the comparison stage, negative responses had longer latencies than did positive responses.

1044. Payne, M., C., Jr. Effects of altering stimulus components upon response latency. Perceptual and Motor Skills, 1970, 31, 924-926.

Two experiments are reported. In Phase 1, O responded by pressing the appropriate key when a light and a sound appeared at the same place and another key when they did not. In Phase 2, relations between location of the light and sound were altered. Phase 3 was identical to Phase 1. Time between presenting a signal and pressing the appropriate key (latency) was measured. Differences in latencies between Phase 1 and Phase 2 were significantly less when both sound and light appeared on the opposite side from the corresponding position of Phase 1 than when only the sound or the light was altered in position.

1045. Peeke, S. C., & Stone, G. C. Sequential effects in two- and four-choice tasks. Journal of Experimental Psychology, 1972, 92, 111-116.

The effect of two- and three-trial sequences of repeated and nonrepeated stimuli on reaction time (RT) was examined using: (a) a four-choice task with one-to-one mapping of stimulus to response and (b) a two-choice task with two-to-one mapping. The "repetition effect" (shorter RTs for repeated events than for nonrepeated events) was observed for both tasks, and three-trial sequences of repeated stimuli gave shorter RTs than two-trial sequences. Reaction times to other three-trial sequences appeared related to probability of occurrence of the sequence. The two-to-one mapping task allowed comparison of equivalent events (the same response made to different stimuli), identical events, and different events. Reaction times to sequences of equivalent, identical, and different events suggest: (a) a facilitating effect of identical events and (b) a disrupting effect of equivalent events. Both effects were eliminated by an intervening different event.

1046. Perlmuter, L. C., Fink, A. M., Taylor, G. A., & Kimble, G. A. Effect of interstimulus interval on conditioning of voluntary instructed responses. Journal of Experimental Psychology, 1969, 79, 403-405.

Three groups of subjects were run in an experiment in which they were required to say a word which was repeatedly presented. Prior to the onset of the word a tone of either .3-, 1.2-, or 2.1-sec. duration was presented and results indicated that subjects learned to respond in anticipation of the word. The percentage of conditioned or anticipatory responses was inversely related to ISI duration supporting Grant's (1964) contention that the conditioning of instructed responses is a subclass of classical conditioning. Twenty extinction trials moderately decreased CR performance and a pseudoconditioning control revealed a lack of CRs.

1047. Peters, J. F., Knott, J. R., Miller, L. H., Van Veen, W. J., & Cohen, S. Response variables and magnitude of the contingent negative variation. Electroencephalography and Clinical Neurophysiology, 1970, 29, 608-611.

When subjects in a fixed fore-period reaction time task are presented with a repetitive stimulus that is terminated by the manual response made to it, the contingent negative variations following the warning stimulus will be of greater magnitude than when a single stimulus, over which the subject has no control, is used. It is suggested that different levels of motivation are involved in these two conditions.

1048. Phillips, W. A., & Baddeley, A. D. Reaction time and short-term visual memory. Psychonomic Science, 1971, 22, 73-74.

Posner's method of using differences in RT for physical and name matches to estimate the time constant of visual STM is criticized as confounding the decay of the visual trace with the development of a name code. When this confounding is avoided by using stimuli that are hard to name (a 5 by 5 matrix of randomly filled squares), the time constant shown by both RT and errors is consistently longer than that reported by Posner.

1049. Pike, A. R. The latencies of correct and incorrect responses in discrimination and detection tasks: Their interpretation in terms of a model based on simple counting. Perception and Psychophysics, 1971, 9, 455-460.

A model for two-choice discrimination based on a process of simple counting is described, and two experiments are performed to test the predictions of the model concerning the graph of latency as a function of response proportion. Two main forms of this graph are identical and predicted to arise in different circumstances. The experimental results support the model, and its possible extension to other psychophysical situations, especially signal detection, are then discussed. It is compared with a model derived directly from the detection situation, and the usefulness of testing these models is pointed out.

1050. Plumb, M. M. Some determinants of choice reaction time in the presence of irrelevant visual information. Dissertation Abstracts International (B), 1971, 31, 7642.

1051. Pollack, I. Speed of classification of words into superordinate categories. Journal of Verbal Learning and Verbal Behavior, 1963, 2, 159-165.

The speed of classifying words into defined superordinate categories was examined. The classification test was chosen in order to differentiate between the effects of stimulus and response diversity upon the speed of information processing. Word lists were presented which differed with respect to the number of possible response categories, e.g., colors; and with respect to the number of available examples per category, e.g., red, green, or blue.

Classification time was found to increase primarily with response diversity, i.e., with the number of possible response categories; and only secondarily with the number of available examples per category, i.e., stimulus diversity. The latter factor, however, becomes more important as the number of response categories is increased.

1052. Porges, S. W. Respiratory and heart rate indices of reaction time. Dissertation Abstracts International (B), 1971, 32, 593-594.

1053. Porges, S. W. Heart rate variability and deceleration as indexes of reaction time. Journal of Experimental Psychology, 1972, 92, 103-110.

Heart rate indexes of reaction time (RT) were investigated in male college students. The Ss were required to perform one of two tasks, either to respond as rapidly as possible following the termination of an extended visual warning or to merely observe the same temporal sequences of nonsignal visual stimuli. In the RT groups following the onset of the warning signal, heart rate variability increased, in anticipation of the termination of the preparatory interval (PI), heart rate variability decreased; and following the onset of the respond signal, both heart rate and heart rate variability increased. In the control groups, there were no significant changes in either heart rate or heart rate variability. In the RT group presented with a schedule of variable PIs, the mean magnitude of heart rate variability reduction in anticipation of the termination of the PI and the mean pretrial heart rate variability were significantly correlated with RT. When the PI was of a fixed duration, the heart rate variability measures were not significantly related to RT.

1054. Posner, M. I., & Boies, S. J. Components of attention. Psychological Review, 1971, 78, 391-408.

The study of human attention may be divided into three components. These are alertness, selectivity, and processing capacity. This paper outlines experimental techniques designed to separate these components and examine their interrelations within comparable tasks. It is shown that a stimulus may be used to increase alertness for processing all external information, to improve selection of particular stimuli, or to do both simultaneously. Development of alertness and selectivity are separable, but they may go on together without interference. Moreover, encoding a stimulus may proceed without producing interference with other signals. Thus, the contact between an external stimulus and its representation in memory does not appear to require processing capacity. Limited capacity results are obtained when mental operations such as response selection or rehearsal must be performed on the encoded information.

1055. Purohit, A. P. Some correlates of inhibition-facilitation effect on reaction-time due to unexpected increase in stimulus intensity. Psychonomic Science, 1966, 5, 53-54.

Ss who showed an inhibitory effect in reacting to an auditory stimulus, the intensity of which was increased unexpectedly, were compared with Ss who showed a facilitatory effect in reacting to a similar stimulus. No difference was noticed between the two groups in introversion, anxiety-neuroticism and autonomic lability measures. There was a significant negative correlation between latency of reaction to a weak stimulus and inhibition-facilitation effect. This result is discussed in terms of the curvilinear performance theory of activation and an alternative explanation is offered.

R

1056. Rebert, C. S., McAdam, D. W., Knott, J. R., & Irwin, D. A. Slow potential change in human brain related to level of motivation. Journal of Comparative and Physiological Psychology, 1967, 63, 20-23.

Negative slow potential change (contingent negative variation or CNV) in human cortex which develops in the foreperiod of a reaction-time experiment was studied as a function of motivational variables. When the warning signal indicated that a difficult-to-detect auditory stimulus would follow, CNV was greater than when an easily detected stimulus was signaled. Instructing Ss to press a key at the onset of the second stimulus resulted in development of larger anticipatory CNV than when no response was instructed. When muscular effort required to complete a response to the 2nd stimulus was varied, larger CNV accompanied greater effort. These findings extend those of other investigators and support the conclusion that CNV reflects cerebral mechanisms related to motivation.

1057. Remington, R. J. The repetition effect: A methodological consideration. Psychonomic Science, 1970, 20, 221-222.

The appropriateness of averaging the reaction times (RT) for stimulus events with different probabilities of occurrence in determining the magnitude of the "repetition effect" was examined. Each of five Ss performed under two experimental conditions: (1) a two-choice condition in which the stimulus events were equiprobable and (2) a two-choice condition in which one of the stimulus events appeared with the probability of .70. A detailed analysis of the data clearly demonstrated how the commonly used averaging process can lead to misleading interpretations regarding the nature of the repetition effect.

1058. Remington, R. J. Analysis of sequential effects for a four-choice reaction time experiment. Journal of Psychology, 1971, 77, 17-27.

In general, the results of the present study support the major findings from the two-choice experiment reported by Remington regarding the importance of higher order stimulus patterns in determining RT and the nature of the repetition effect. Similar to the two-choice findings the results from a detailed sequential analysis of four-choice RTs suggest that certain higher order sequential effects are as important as the more popular repetition effect (i.e., third-order sequential effects similar to the repetition effect in magnitude were found under both experimental conditions). Clearly, higher order sequential effects deserve similar study and treatment in any theoretical formulation advanced to account for sequential effects in choice reaction processes.

The results of the present study have definite methodological implications. Detailed examination of the four-choice data lends support to the position advanced by Remington concerning the inappropriateness of the common practice of collapsing or averaging over components which make up an experimental condition. For example, the differential effects among the nonrepetition components found in the present four-choice data would not have been detected by the customary sequential analysis in which all nonrepetition components are pooled to arrive at a single value for nonrepetitions. Undetected differential effects among the nonrepetition components could easily lead to misleading interpretations regarding the nature of the repetition effect. The findings from the present study indicate the appropriateness of certain simplifying assumptions should be empirically determined by a detailed sequential analysis of each component which makes up the experiment condition.

1059. Remington, R. J. The effects of advance information on human information processing in a choice reaction task. Psychonomic Science, 1971, 24, 171-173.

A study was conducted to explore the human's ability to take advantage of the advance information which significantly reduces the amount of uncertainty associated with the up-coming trial in a choice reaction task. Each of eight Ss performed under three experimental conditions: (1) a six-choice condition with 2.58 bits of average stimulus uncertainty, (2) a four-choice condition with only 0.99 bits of average stimulus uncertainty, and (3) a condition consisting of a randomized merge of the stimulus sequences used in the previous two conditions in which information regarding the uncertainty (i.e., 2.58 or 0.99 bits) associated with the up-coming trial was advanced .5, 1, or 2 sec before the presentation of the stimulus signal. It was found that the Ss could reliably take advantage of advance information to reduce their response time as long as the delay between the advance information and the stimulus signal was 1 sec or longer. In addition, it was found that advance information had little effect on first- and second-order sequential effects customarily found in choice reaction time data.

1060. Ross, J. Extended practice with a single-character classification task. Perception and Psychophysics, 1970, 8, 276-278.

Extended practice was given on a single-character classification task with four nested checklists of Sizes 1, 2, 4, and 8 defining positive sets. Reaction time reduces with practice, but is linear with the logarithm of checklist size at all stages of training, and transfers to characters of large size and different case.

1061. Rutschmann, R. Perception of temporal order and relative visual latency. Science, 1966, 152, 1099-1101.

Judgments of temporal order to monocular pairs of flashes of equal luminance delivered at various onset asynchronies to the light-adapted fovea and periphery show that uncertainty of temporal order results when the onset of the foveal flash is delayed. Relative latencies vary as a function of peripheral (nasal vs. temporal) locus stimulated.

S

1062. Sanders, A. F. Probabilistic advance information and the psychological refractory period. Acta Psychologica, 1971, 35, 128-137.

The subject's task was to respond to the second of two signals (S_1,S_2) which were presented in rapid succession. S_1 could either be neutral or provide probabilistic advance information with respect to the state of S_2. The data show that a minimal interval of 200 msec is needed between the signals in order to find a beneficial effect of advance information, irrespective of constant or variable intervals within a block of trials. This result is discussed in terms of capacity sharing and single channel interpretations of the psychological refractory period, supporting the latter view.

When the information provided by S_1 was also given at the beginning of a trial S_1 had a clear inhibitory effect on reaction time, compared with the situation where S_2 was presented alone. Some possible reasons are discussed to explain the divergence between this result and those on the time course of preparation.

1063. Sanford, A. J. Effects of changes in the intensity of white noise on simultaneity judgements and simple reaction time. Quarterly Journal of Experimental Psychology, 1971, 23, 296-303.

1064. Schlesinger, I. M., & Melkman, R. Choice reaction-time and size of stimulus-set when transmitted information is held constant. American Journal of Psychology, 1966, 79, 596-601.

It is generally accepted that choice-reactions are a function of the amount of transmitted information. This paper advances the hypothesis that reaction-times are dependent also on the amount of stimulus-information when the latter is varied independently of transmitted information.

In the present study, stimulus-information was varied by varying the number of alternative stimuli. In doing this it is necessary to keep stimulus-information and similarity unconfounded. This was done by letting the Ss discriminate between a set of familiar and a (subjectively) indefinitely larger set of unfamiliar stimuli. In such a two-choice task, responses of 20 Ss to familiar patterns required significantly less time than responses to the unfamiliar patterns. Thus, the hypothesis was corroborated.

A 'matching model' which was advanced to account for the effect of stimulus-information was tested by comparing response-times in two experimental conditions: (a) when there were four alternative familiar patterns; and (b) when the number of these patterns was only two. Contrary to predictions derived from the model, the smaller number of alternatives was effective in reducing response-times only to familiar patterns.

1065. Schmidt, R. A., & Christina, R. W. Proprioception as a mediator in the timing of motor responses. Journal of Experimental Psychology, 1969, 81, 303-307.

The hypothesis that proprioceptive feedback from early portions of a total movement may serve as a cue for the anticipation and timing of a later portion was tested using 48 Ss. The right-hand task involved anticipation (with no preview) of the coincidence of a moving and a stationary pointer, and proprioceptive feedback was manipulated by having Ss make a minimal movement or a small or large rotary movement with the left hand during the interval to be timed. Although neither absolute nor algebraic error was affected by the treatments, the number of beneficial anticipations (absolute errors less than 133 msec.) was significantly larger for intermediate than for minimal left-arm activity, supporting the view that proprioceptive feedback serves as a mediator in tasks requiring precise anticipation and timing.

1066. Sekuler, R., Rubin, E., & Armstrong, R. Processing numerical information: A choice time analysis. Journal of Experimental Psychology, 1971, 90, 75-80.

The time needed for human adults to identify the numerically larger of two digits was studied. In Exp. I, the digits to be compared were presented in succession at two different exposure durations. In Exp. II, a single visually presented digit was compared with another digit held in memory. In both experiments, the larger the numerical difference, the faster the identification.

1067. Seymour, P. H. K. Response latencies in classification of word-shape pairs. British Journal of Psychology, 1969, 60, 443-451.

The experiment examined classification times for the four word–shape pairs produced by combining the labels square and circle with the shapes SQUARE and CIRCLE. Times were obtained for each of the three possible 2:1 mappings of the four display pairs to the verbal responses 'yes' and 'no'. These define three conditions in which the basis of the classification is respectively the shape, the label, or both the label and the shape. Classification times were significantly slower where both component displays were relevant for selection of the response. Moreover, under this condition, classification times for circle/CIRCLE and square/SQUARE were faster for the response 'yes' than for the response 'no', whereas this effect was reversed for the pairs square/CIRCLE and circle/SQUARE. The implications of these findings are discussed.

1068. Seymour, P. H. K. Matching latencies for word-shape pairs. Quarterly Journal of Experimental Psychology, 1969, 21, 312-321.

1069. Seymour, P. H. K. Conceptual uncertainty and the latency of judgements of the congruence of word-shape pairs. Acta Psychologica, 1970, 34, 451-461.

The latencies of verbal reports of the congruence of simultaneously displayed printed words and shapes were recorded. The labels used were black, white, large, small, square and circle, the comparison shapes being squares or circles having one of two values on the dimensions of colour and size. Latencies were about 700 msec where Ss reported 'yes' for same pairs and 'no' for different pairs, but were nearly 250 msec slower where this response allocation was reversed. Manipulation of the size of the set of labels from which displays were drawn within a block of presentations had little effect on the latency under either response allocation. However, where the set was limited to two labels referring to a single dimension, times were faster for congruent pairs than for incongruent pairs. This effect was eliminated as the size of the set of labels was increased.

1070. Seymour, P. H. K. Representational processes in comprehension of printed words. British Journal of Psychology, 1970, 61, 207-218.

Three studies of the latency of response initiation for complex classifications of the word–shape configurations circle/CIRCLE, square/SQUARE, square/CIRCLE and circle/SQUARE are reported. Delays in response initiation, attributable to discrepancy between the display components, or the order of reporting identities and congruence, or alterations in the processing demands imposed on the subject, were analysed with the aim of formulating some conclusions about the nature of the representational processes involved when a printed word is read with comprehension.

1071. Seymour, P. H. K. Order of fixation effects in classification of word-shape pairs. Quarterly Journal of Experimental Psychology, 1970, 22, 440-449.

1072. Seymour, P. H. K. Perceptual and judgemental bias in classification of word-shape displays. Acta Psychologica, 1971, 35, 461-477.

In Experiment 1, 20 subjects classified compound stimuli formed by combining the words large or small with LARGE or SMALL squares under a normal congruence-report allocation (same → 'Yes', different → 'No'), or under a reversed allocation (same → 'No', different →'Yes'). Under the normal allocation the display large/LARGE was generally classified as 'Yes' faster than small/SMALL or the incongruent displays. Under the reversed allocation congruent displays were classified faster than incongruent displays, but no difference appeared between large/LARGE and small/SMALL. Also, response times were slower under the reversed allocation than under the normal allocation. In Experiment 2, 12 subjects classified the displays white/LARGE, black/SMALL, white/SMALL and black/LARGE, as 'Yes' or 'No' under allocations which mimicked Experiment 1. In this set, where a congruence relation was not involved, reversal of the display-report allocation did not affect response times. However, times for individual displays were indicative of bias towards whichever display included a LARGE shape and was also assigned to the response 'Yes'. Some implications of these results for a general theory of congruence judgements are suggested.

1073. Seymour, P. H. K. Effects of repetition of display components on the latency of multiple reports of congruence. Quarterly Journal of Experimental Psychology, 1971, 23, 82-96.

1074. Shaffer, L. H. Attention in transcription skill. Quarterly Journal of Experimental Psychology, 1971, 23, 107-112.

1075. Simon, J. R., & Craft, J. L. Communicating directional information with an auditory display. Journal of Applied Psychology, 1971, 55, 241-243.

This study was concerned with determining whether right or left commands could be communicated more effectively using symbolic, directional, or combined directional and symbolic cues. In a choice reaction time (RT) task, Ss pressed a right- or left-hand key in response to: (a) 1,000 Hz or 4,000 Hz binaural tonal commands (symbolic cue), (b) the ear stimulated by a single pure tone (directional cue), and (c) 1,000 Hz or 4,000 Hz monaural tonal commands in the ear corresponding to the symbolic content of the command (combined directional and symbolic cues). The combined (redundant) cue condition produced the fastest RT, while RT to the directional cue alone was faster than to the symbolic cue alone.

1076. Simon, J. R., Craft, J. L., & Small, A. M., Jr. Reactions toward the apparent source of an auditory stimulus. Journal of Experimental Psychology, 1971, 89, 203-206.

Reactions to binaural tonal commands signifying "right" or "left" were significantly slowed when the meaning of the command conflicted with its apparent source. Manipulation of relative phase of the tones at the ears provided the means of altering the apparent source of the command as well as the strength of the irrelevant directional cue. Results indicated that the stronger the directional cue, the greater the interference with information processing.

1077. Simon, J. R., Craft, J. L., & Webster, J. B. Reaction time to onset and offset of lights and tones: Reactions toward the changed element in a two-element display. Journal of Experimental Psychology, 1971, 89, 197-202.

In Exp. I, the task involved responding to the onset or offset of one light in a two-light display. On onset trials, reactions were faster toward the light which went on (changed element) than toward the light which remained off (unchanged element). Similarly, on offset trials, reactions were faster toward the light which went off (changed element) than toward the light which remained on (unchanged element). Experiment II involved an analogous auditory task which consisted of pressing right- or left-hand keys in response to the onset or offset of a tone in one ear. On onset trials, results paralleled Exp. I, i.e., faster reactions on the side of the changed element. On offset trials, however, reactions were faster on the side of the unchanged element. All findings were consistent with the notion of a potent stereotypic tendency to react toward the apparent source of stimulation.

1078. Smith, L. E. Individual differences in maximal speed of muscular contraction and reaction time. Perceptual and Motor Skills, 1965, 21, 19-22.

Fifty college men participated in an investigation of the relationship between standing RT and the maximal vertical velocity which the body can generate while in contact with the ground. The results support recent studies which reflect the high degree of specificity of individual differences in motor abilities. The nonsignificant correlation of −0.31 indicates that vertical body speed cannot be predicted from a knowledge of standing RT.

1079. Staudenmayer, H., & Schvaneveldt, R. W. Instruction and stimulus properties in processing relevant-redundant information. Journal of Experimental Psychology, 1971, 89, 175-180.

The effects of instructions, discriminability, and redundancy were investigated in a constrained-classification task with multidimensional stimuli. Ten conditions were run with 16 Ss in each. Each condition consisted of three phases: training, overtraining, and conflict. Mean reaction time ($\overline{RT}$) in overtraining for instructed relevant-redundant dimensions was faster than either component dimension alone only when both dimensions were highly discriminable. Similar trends were found for conditions with an added noninstructed relevant-redundant dimension, lending support to a parallel, self-terminating model of information processing. However, such a model alone cannot account for the results in the conflict phase. The results in conditions with dimensions unequal in discriminability were also not consistent with the parallel, self-terminating model. When one dimension was difficult to discriminate, $\overline{RT}$ for the instructed relevant-redundant dimension condition fell between $\overline{RT}$ for the fast and slow dimensions, a result which implies serial, self-terminating processing.

1080. Steinman, A. R. Reaction time to change compared with other psychophysical methods. Archives of Psychology, 1944, 292, 60 pp.

The purpose of the study was to examine the adequacy of simple reaction time (RT) to change as a psychophysical method. In the first of 4 experiments the relation of RT to changes of brightness and stimulus intensity was investigated. RT was found to decrease as the magnitude of the change increased, for the mean RT the decrease showed a hyperbolic function. RT was found to decrease as intensity increased up to a medium level, there after RT increased with increasing intensities. In the second experiment the stimulus ratio required for the liminal brightness increment was shown to decrease as a function of intensity in the manner described by the data of Konig and Brodhun. In the last 2 experiments, it was found that over a portion of the stimulus range, the speed of response was related in a regular manner to apparent magnitude as judged by the method of Single Stimuli. For equal decrements and increments of brightness, RT was found faster for decrements. Similarly, decrements were shown to be judged greater than objectively equal increments. It may be concluded that simple RT to change is an adequate psychophysical method.

1081. Stone, G. C. Response latencies in visual search involving redundant or irrelevant information. Perception and Psychophysics, 1971, 9, 9-14.

Three properties of models for comparison of multiattribute visual stimuli were considered: parallel vs serial processing, efficient vs exhaustive comparisons, and biased vs unbiased acceptance of attributes for processing. Ss performed two comparison tasks, matching-to-sample (M) and identification of odd stimuli (O), with color and form attributes presented singly and in redundant and nonredundant pairings. Analyses of means and of total distributions of response latencies supported the conclusion that parallel and efficient comparisons were the rule, along with a kind of partial selection of attribute to be processed. Ss differed in their relative speed of processing form and color attributes, and these differences accounted for most, but not all, of the differences among them in processing multiattribute stimuli.

1082. Stone, G. C. Individual differences in information processing: Comparison of simple visual stimuli. Perceptual and Motor Skills, 1971, 33, 395-414.

Information-processing approaches to cognitive function suggest a new way of viewing individual differences in intellectual capabilities. Response latencies of 40 young adults were measured in two batteries of visual comparison tasks, and a number of scores developed from these latencies were considered from a psychometric point of view. Data from three sessions per S did not permit reliable estimation of rational parameters but did support efforts to dissect the components of latency to a limited extent. Over-all latency was separated into latency in optimal trials and dispersion upward from this optimal value. The dispersion component was found to be common to a variety of tasks. Three-fourths of the variance in optimal latencies was common to all tasks. A portion of the remaining variance could be assigned, with only moderate reliability, to inter-individual variation in dealing with form and color information, to differences related to the task format (matching versus oddity), and to differences in gains with practice. Residual variance probably reflects task-specific factors as well as the effects of the immediate context within which a task is performed.

1083. Surwillo, W. W. The relation of simple response time to brain-wave frequency and the effects of age. Electroencephalography and Clinical Neurophysiology, 1963, 15, 105-114.

An experiment was performed to verify a previous finding of a positive correlation (0.81) between response time and period of the EEG. Details of this relationship, with reference to age and to a hypothesis concerning the function of the brain-wave cycle in simple behavior, were investigated.

Reaction times and average period of the EEG, recorded in the interval of time between stimulus and response, were determined for 100 subjects ranging in age from 28-99 years. The major results were:

1. The previous finding was confirmed. In the present study a correlation coefficient of 0.72 was obtained between average reaction time and the average period of the EEG.

2. Excluding age from this relationship through the use of partial correlation scarcely altered this coefficient. Age as a factor in the observed correlation was, therefore, ruled out.

3. A highly significant positive correlation was obtained between age of the subjects and the average period of their brain waves.

4. A low but statistically significant positive correlation was found relating average reaction time and age. This positive coefficient vanished and became negative when brain-wave period was "partialled out". It was inferred, therefore, that EEG frequency is the central nervous system factor behind age-associated slowing in response time.

5. Evidence derived from data of each subject taken singly showed the presence of a positive correlation between brain-wave period and reaction time in individual subjects.

6. Taken as a whole, the data support the hypothesis that the brain-wave cycle is the basic unit of time in terms of which a response is programmed by the central nervous system.

1084. Surwillo, W. W. The relation of decision time to brain wave frequency and to age. Electroencephalography and Clinical Neurophysiology, 1964, 16, 510-514.

An experiment was performed to determine whether the time taken to decide between two alternatives is related to period of the EEG. In addition, the relation of decision time to subject's age was investigated, and the role of EEG period in this relationship was determined.

Simple reaction time and disjunctive reaction time, in which the subject was required to respond to only one of two alternative stimuli, were determined for 54 subjects ranging in age from 34-92 years. EEGs were recorded, and for both tasks the average period of the EEG was determined from the tracings obtained in the interval of time between stimulus and response.

Strong evidence was obtained for the proposition that subjects with slow brain waves require more time to decide between two alternatives than subjects with fast brain waves. This finding was discussed with reference to information theory, and it was concluded that the information capacity of the central nervous system is a function of EEG period.

A low but statistically significant positive correlation was found between decision time and age. This correlation completely vanished when brain wave period was partialled out, suggesting that EEG frequency is the factor behind the age-associated drop in information capacity of the central nervous system.

1085. Surwillo, W. W. Human reaction time and period of the EEG in relation to development. Psychophysiology, 1971, 8, 468-482.

Simple auditory reaction time (RT) and an auditory RT task requiring a disjunctive reaction were investigated in a group of 110 boys aged 46-207 months. Electroencephalograms (EEGs) were recorded during actual performance of these tasks to determine the extent to which differences in RT associated with development could be accounted for by developmental changes in the EEG. Measures of average EEG period were derived from peaks and troughs of all waves recorded in the time interval between stimulus and response of each trial.

Results confirmed previous findings of a significant relationship between RT, σ_{RT}, and development. RT and σ_{RT} followed a reciprocal power-law function with age, and hence both measures decreased more rapidly in the earlier years. Choice RT showed a more rapid decline with increasing age than simple RT. Correlations were high, with log simple RT vs log Age = −.874, and log choice RT vs log Age = −.861. Developmental changes in EEG period could account for only a small fraction of these high correlations. The possible role of EEG half waves as time quanta in information processing was discussed in relation to development.

1086. Surwillo, W. W. Human reaction time and endogenous heart rate changes in normal subjects. Psychophysiology, 1971, 8, 680-683.

1087. Sutton, D., & Burns, J. Alcohol dose effects on feedback-maintained simple reaction time. Journal of Psychology, 1971, 78, 151-159.

Two dose levels of alcohol were given to 10 subjects performing finger extension and finger flexion in a reaction time (RT) paradigm. In all cases, trial-by-trial display of RT was provided. Two stimulus modes—visual and auditory—were investigated. RTs were briefer to auditory than to visual stimuli. Flexion and extension responses were approximately equal in RT latency. Alcohol impaired females in their performance of each response but did not affect males significantly. Apparent differences in attitude toward the trial-by-trial display account for the differential effect.

1088. Swanson, J. M. Recoding in a memory search task. Dissertation Abstracts International (B), 1971, 32, 597.

1089. Swensson, R. G., & Edwards, W. Response strategies in a two-choice reaction task with a continuous cost for time. Journal of Experimental Psychology, 1971, 88, 67-81.

Each trial of a two-choice task rewarded S for a correct response, but charged a cost proportional to his response time. Seven of the eight Ss in three experiments violated predictions of the random-walk model and confirmed those of the fast-guess model by using only two response strategies in all conditions. These Ss either responded accurately or made a detection response when the stimulus appeared, accepting chance-level error rates to respond 15-20 or 45-70 msec. faster (for two different types of stimuli). Stimulus frequency and payoffs primarily determined which strategy S would adopt. Data were ambiguous for only one S equally well fit by the random-walk model and by assuming that he intermittently guessed on some proportion of trials.

1090. Symington, L. E. Reaction time: A bibliography with abstracts. Supplement I - With index for entire bibliography. Human Engineering Laboratories, U. S. Army Aberdeen Research & Development Center, Aberdeen Proving Ground, Maryland, July 1971.

This bibliography is an extension of Kamlet, A. S. & Boisvert, L. J. Reaction time: A bibliography with abstracts. It is a compilation of 351 abstracted references dealing with reaction time in selected human information-processing tasks through December 1970. The references are arranged in alphabetical order by author. An alphabetic index of pertinent parameters of investigation for the 891 references of both this extension and the original bibliography is also provided.

T

1091. Tecce, J. J. Contingent negative variation and individual differences. Archives of General Psychiatry, 1971, 24, 1-16.

Contingent negative variation (CNV) is a slow surface-negative cortical potential in the human brain that is related to individual differences in psychological functions. Major sources of interindividual variability in CNV development among normal adults, children, and psychiatric patients involve attention and arousal functions. Consequently, a two-process theoretical model is postulated to account for individual differences in CNV, namely, that CNV amplitude is positively and monotonically related to attention functions and nonmonotonically (inverted-U) related to arousal functions. CNV also appears to be reflecting motor processes. Although CNV is a potentially useful tool in psychiatric research, eye movements can drastically alter CNV and are a serious methodological problem requiring further study. The neurophysiological genesis of CNV involves both cortical (apical dendrites in upper layers of frontal cortex) and subcortical (brain stem reticular formation) mechanisms.

1092. Tecce, J. J. Contingent negative variation (CNV) and psychological processes in man. Psychological Bulletin, 1972, 77, 73-108.

Contingent negative variation (CNV) is a slow, surface-negative electrical brain wave. The basic experimental paradigm for generating CNV is like that of a constant-foreperiod reaction time task and involves the presentation of a warning stimulus (S_1) followed by an imperative stimulus (S_2), to which a motor response is usually required. CNV appears within the S_1–S_2 interval as a negative shift in the electroencephalogram (EEG) base line that averages approximately 20 microvolts (μv). Interpretations of CNV findings have involved the psychological processes of expectancy, conation, motivation, and attention. A two-process theoretical model is proposed to account for CNV results: Magnitude of CNV is positively and monotonically related to attention and nonmonotonically (inverted U) related to arousal level. CNV is also associated with other kinds of electrophysiological activity, notably autonomic functions and slow cerebral potentials that accompany voluntary motor movements. Although CNV is clearly a cerebral phenomenon, eye movements can seriously distort its measurement. It is concluded that CNV is an electrical phenomenon of the human brain that is related chiefly to attention and arousal functions.

1093. Tecce, J. J., & Scheff, N. M. Attention reduction and suppressed direct-current potentials in the human brain. Science, 1969, 164, 331-333.

Distraction suppresses direct-current potentials (contingent negative variation) recorded from the human scalp. This reduction is accompanied by retarded reaction time. Contingent negative variation and reaction time appear to reflect a common process, attention.

1094. Teichner, W. H., & Olson, D. E. A preliminary theory of the effects of task and environmental factors on human performance. Human Factors, 1971, 13, 295-344.

An attempt is made to develop a systematic approach to the prediction of human performance as a function of task variables and environmental factors. The approach uses the basic literature of experimental psychology and of physiology in a context in which postulates and assumptions about underlying processes and empirical relationships are made as specific as possible. This paper is a presentation of the postulates, assumptions, and models for handling them. Its aim is toward organization and feasibility rather than toward a final theory of human performance. What is presented is more in the nature of a model of what a general theory might be and the variables of importance rather than a theory as such.

1095. Thrackray, R. I., & Jones, K. N. Level of arousal during Stroop performance: Effects of speed stress and "distraction." Psychonomic Science, 1971, 23, 133-135.

Heart rate and respiration were obtained during Stroop performance. Although the test is often reported to evoke strong feelings of frustration, no evidence of increased autonomic arousal was found to be associated with the color-word interference effect, and this did not change with the addition of auditory "distraction." Increasing stimulus presentation rate increased arousal, but this was independent of color-word interference.

1096. Thomas, E. A. C. Sufficient conditions for monotone hazard rate. An application to latency-probability curves. Journal of Mathematical Psychology, 1971, 8, 303-332.

It is assumed that when a subject makes a response after comparing a random variable with a fixed criterion, his response latency is inversely related to the distance between the value of the variable and the criterion. This paper then examines the relationship to response probability of (a) response latency, (b) difference between two latencies and (c) dispersion of latency, and also some properties of the latency distribution. It is shown that the latency-probability curve is decreasing if and only if the hazard function of the underlying distribution is increasing and, by using a fundamental lemma, sufficient conditions are obtained for monotone hazard rate.

An inequality is established which is satisfied by the slope of the Receiver Operating Characteristic under these sufficient conditions. Finally, a Latency Operating Characteristic is defined and it is suggested that such a plot can be useful in assessing the consistency between latency data and theory.

1097. Thompson, L. W., & Botwinick, J. Stimulation in different phases of the cardiac cycle and reaction time. Psychophysiology, 1970, 7, 57-65.

Several studies have suggested that reaction time (RT) may be related to variations in blood pressure which occur with each heart beat. This was tested in a series of four studies in which possible effects of the preparatory interval (PI) were controlled. Stimuli were presented at 0, 200, 400, and 600 msec following the R wave, and during the ascending slope of the R, T, and P waves of the cardiac cycle. No relationship was found in any of the four studies between RT and the phase within the cardiac cycle when the stimulus occurred.

1098. Thorton, J. W. Avoidable and unavoidable shock transfer. Perceptual and Motor Skills, 1970, 31, 940.

1099. Thornton, J. W., & Jacobs, P. D. Analysis of task difficulty under varying conditions of induced stress. Perceptual and Motor Skills, 1970, 31, 343-348.

Two tasks (simple and choice reaction time) were examined while varying three types of stressors (shock, threat of shock, and noise) and the stressor task relationship (i.e., task-related stress, task-unrelated stress, and no-stress). Four specific hypotheses were tested and 3 were supported in the simple reaction-time task. There were no significant differences among stressors for either task, although greater differences were reported in the simple than in the choice reaction-time task. A significant difference between the "task-relatedness" of stress levels in the simple task was interpreted as possibly due to a "coping" or "protective adaptive mechanism" in which increases in performance serve to reduce stress. Practical applications were examined.

1100. Thorton, J. W., & Jacobs, P. D. Learned helplessness in human subjects. Journal of Experimental Psychology, 1971, 87, 367-372.

The present investigation attempted to test the learned helplessness hypothesis with human Ss. Four groups differing in shock contingency were given a fixed level of shock, while a second four groups were given a variable level of shock. Thirty choice reaction time training trials were given in which one group could avoid shock, a second and third group received inescapable shock yoked to the escapable group (one with a training task to perform and one without), and the fourth performed the task but with no shock. Ten test trials, in a completely different task, followed in which all Ss could avoid shock. Results revealed in all phases of the experiment that variable shock was superior to a fixed level as a stress inducer. Learned helplessness was offered as an explanation to the yoked group's lack of responses in test trials. Implications for investigation of learned helplessness in humans and for the use of variable shock were discussed.

1101. Tolkmitt, F. J., & O'Connor, G. P. Influence of stimulus discriminability on psychological refractory period effect. Perceptual and Motor Skills, 1971, 33, 571-574.

Ten undergraduate students were tested in a psychological refractory period paradigm. Stimulus 1 was a visual discrimination task (same-different) and S2 was a 1,000-Hz tone. Discriminability of S1 and ISI were varied. Ss always had to respond to S2, but to S1 only when it was "same." Discriminability of S1 was found to affect R2, irrespective of whether or not S1 was followed by an overt response. Such a result poses difficulties to expectancy and response-conflict theory.

1102. Tominaga, Y. The choice reaction time in response to the direction of tonal signals under noise: The effect of the use of earplugs. Journal of Science of Labour, 1969, 45, 594-604.

As an indicator of detectability or discriminability of the tonal signal, the choice reaction time (CRT) in response to the direction of the warble tone emitted from one of the speakers located in the directions 45 degrees right and left in front of the subject was examined under broad band noise emphasized at low frequencies.

The experimental results are summarized as follows:

1. The CRT depends approximately on the sensation level of the signal or signal to noise ratio. As for signals below a certain level the CRT was remarkably prolonged.

2. The CRT was also affected by the stimulus series. In an experimental block in which both the signal level and the noise level were constant, the CRT was relatively short. But when both levels were randomly varied in a block, longer CRT was obtained.

3. In the case where both the signal level and the noise level were randomly varied in a block the CRT for signals of the same sensation level tends to vary depending on the received level of the signal. CRT for 40 db signal and 20 db noise (critical band level) was longer than that for 60 db signal and 40 db noise.

4. If the experimental results are considered in relation to workers listening tonal signals in plant with constant noise, it is suggested that frequent wearing and removing of ear plugs may give unfavorable effect upon detection of auditory signals although constant use of ear plugs does not.

1103. Townsend, J. T. A note on the identifiability of parallel and serial processes. Perception and Psychophysics, 1971, 10, 161-163.

Due to the significant research effort devoted to discovering whether certain psychological processes are serial or parallel, it seems important to establish the degree to which such processes are identifiable and to investigate possible ways in which such knowledge can improve our experiments. General definitions of parallel and serial systems are given, followed by a qualitative summary of identifiability results obtained with special classes of exponential systems. Some of these results are applied to a current experimental paradigm, and possible techniques are suggested to provide stronger serial-parallel tests and acquire more temporal processing information. Finally, the possibility of S's possessing the ability to manipulate his distribution of processing energy is reacknowledged.

1104. Treisman, A. M., & Fearnley, S. Can simultaneous speech stimuli be classified in parallel? Perception and Psychophysics, 1971, 10, 1-7.

Reaction times to detect a known or unknown digit in paired or single auditory test stimuli were measured. The results suggest that in classification or matching tasks with stimuli belonging to separate verbal classes, parallel or selective processing may be possible. There was no interaction of type of task (classify vs match) with either dichotic vs mixed monaural presentation, or pairs vs single stimuli, or negative vs positive responses. An attempt was made to suggest the separate processing stages underlying performance in this task.

V

1105. van Assen, A., & Eijkman, E. G. Reaction time and performance in learning a two dimensional compensatory tracking task. Ergonomics, 1970, 13, 707-717.

Describes a series of experiments consisting of discontinuous step function tracking in 2 dimensions. Ss had to compensate for a stepwise deflection of a spot on a CRT by means of 2 knobs, 1 controlling the horizontal, and the other the vertical movement of the spot. Three different learning phenomena in step function compensation tracking were distinguished. Two stages were recognized in the processing of incoming signals: first the classification of the signals by an analyzing mechanism, and second the formation and direction of a trigger signal by a mechanism. The processing time required by these 2 mechanisms constituted the latency of the compensatory response or RT. As a result of the processing, a trigger signal set off a programed response. The program improved with practice, and this is demonstrated by means of a measure called "quality of the response."

1106. Vaughan, H. G., Jr., Costa, L. D., & Gilden, L. The functional relation of visual evoked response and reaction time to stimulus intensity. Vision Research, 1966, 6, 645-656.

Latency of the average visual evoked response (VER) and motor reaction time (RT) were studied as a function of stimulus intensity for brief photic stimuli subtending 4^{o} and $1{\cdot}5^{o}$ of visual angle in two subjects. Both VER latency and RT showed an accelerating increase for each tenfold diminution in intensity down to the region of foveal threshold Below foveal threshold no responses were obtained for the $1{\cdot}5^{o}$ stimuli; there was an inflexion in the VER latency and RT curve of responses to the 4^{o} stimuli. Over the photopic range of intensities, VER latency and RT were closely described by power functions varying in exponent from −0·29 to −0·44. The values for VER were −0·36 for the 4^{o} stimuli and −0·40 for the $1{\cdot}5^{o}$ stimuli, which were significantly different ($p < 0{\cdot}01$). Although latency of VER was the same for both subjects for each stimulus condition, RT showed a consistent difference between subjects of about 25 msec. RT is considered to be determined by at least two independent mechanisms. The first, retinal in location, follows a power function of intensity; the second is related to variability in efferent processes.

1107. Versteeg, A. D. The effect of stimulus area on the reaction time to the onset and cessation of visual stimulation in the periphery. Dissertation Abstracts International (B), 1971, 32, 2428.

W

1108. Wallace, R. J. S-R compatibility and the idea of a response code. Journal of Experimental Psychology, 1971, 88, 354-360.

The Ss pressed one of two keys placed to their left or right when one of two stimuli were presented. A stimulus could occur on the left or right, or above or below a fixation point. The Ss performed with their hands uncrossed or crossed. Compatibility effects were found to hold between the position of the stimulus (left or right) and that of the response key, whether or not the hands were crossed. Thus the effects did not depend on the relation between a stimulus and a particular motor output. It was hypothesized that the positions of both the stimulus and the responding hand were related to a spatial code, and the outcome of a comparison between their representations in this code was responsible for the differences in compatibility. A second experiment suggested that there were both facilitation and interference in the compatible and incompatible situations, respectively.

1109. Wallace, R. M., & Fehr, F. S. Heart rate, skin resistance, and reaction time of mongoloid and normal children under baseline and distraction conditions. Psychophysiology, 1970, 6, 722-731.

Reaction time, body movement, heart rate, and skin resistance of Mongoloid and "normal" control children were evaluated under baseline and distraction conditions. Relative to controls, Mongoloids demonstrated (1) slower reaction time under both conditions, (2) a reduced skin resistance response and fewer heart rate fluctuations during the baseline period, and (3) fewer skin resistance fluctuations during the distraction condition. Furthermore, skin resistance fluctuations were negatively correlated with reaction time, and heart rate fluctuations, although not significant, were in the same direction. These findings offer some support for the theoretical assertions of Lacey and Lacey (1958) that spontaneous activity is related to motor impulsivity, cortical activity, and general skeletal-motor functions. Body movement was negatively related to these measures of spontaneous activity and thus cannot be invoked as an explanation for the findings.

1110. Warm, J. S., & Alluisi, E. A. Influence of temporal uncertainty and sensory modality of signals on watchkeeping performance. Journal of Experimental Psychology, 1971, 87, 303-308.

The effects of signal density on the detection of increments in the duration of regularly occurring acoustic and visual pulses were assessed in a 1-hr. watchkeeping task. Five levels of signal density (6, 12, 24, 48, and 96 signals/hr) were combined factorially with the two sensory modalities to produce a total of 10 experimental conditions. Overall performance efficiency, in terms of both detection probability and response time (RT) to correct detections, was greater for acoustic than for visual signals. Variations in signal density were not associated with significant changes in the probability of correct detections. On the other hand, RT increased as a linear function of signal surprisal due to density—an information measure of the temporal uncertainty of signals.

1111. Warren, R. E. Stimulus encoding and memory. Dissertation Abstracts International (B), 1971, 32, 599-600.

1112. Well, A. D. The influence of irrelevant information on speeded classification tasks. Perception and Psychophysics, 1971, 10, 79-84.

Multidimensional stimuli, which could vary on one, two, or all three dimensions within a particular series, were presented to Ss who were required to classify each stimulus on the basis of its value on a specified dimension. The prior relevance of the irrelevant dimensions and the difficulty of the task were varied. Latency and error data indicated that Ss were unable to gate the irrelevant information effectively. It was further concluded that this lack of perfect gating cannot be simply attributed to competing responses learned during the experiment.

1113. Whitman, C. P., & Geller, E. S. Prediction outcome, S-R compatibility, and choice reaction time. Journal of Experimental Psychology, 1971, 91, 299-304.

Intrasequential effects of prediction outcome (PO) on choice reaction time (choice RT) were studied in a two-alternative reaction task under two levels of S-R compatibility. Given a correctly predicted event, choice RT was significantly shorter when the preceding PO was correct than when it was incorrect. For incorrectly predicted events in a Compatible condition, preceding correct POs lengthened choice RT but in an Incompatible condition, preceding correct POs shortened choice RT. For a Compatible condition the relationships between preceding PO and choice RT were consistent with continuous expectancy theory, but for an Incompatible condition the relationships were not explained by expectancy theory. The implication that an expectancy model best predicts the effects of independent variables on the stimulus identification component of the choice reaction process is discussed.

1114. Whitman, C. P., & Geller, E. S. Runs of correct and incorrect predictions as determinants of choice reaction time. Psychonomic Science, 1971, 23, 421-423.

Intrasequential effects of prediction outcomes on choice reaction speed (CRS) were studied in a two-alternative reaction task. Prior to each of 300 stimulus presentations, Ss predicted the next stimulus; following each presentation, Ss identified the stimulus by pressing one of two reaction triggers. Not only was CRS faster to predicted than nonpredicted events, but given a correctly or incorrectly predicted event, CRS was significantly faster when the preceding prediction outcomes were correct than when they were incorrect. The implications of these results for dichotomous and continuous notions of expectancy are discussed.

1115. Wilcox, L., & Wilding, J. M. Effect of item similarity on the speed of memory search. Nature, 1970, 227, 1152-1153.

1116. Wilding, J. M. The relation between latency and accuracy in the identification of visual stimuli. I. The effects of task difficulty. Acta Psychologica, 1971, 35, 378-398.

Existing results concerning the relation between latency and accuracy are reviewed and it is concluded that when the stimuli are easily identified errors are faster than correct responses, and when the stimuli are difficult to identify errors are slower than correct responses. Theories are examined which explain the first type of error only or the second type of error only, but no theory encompasses both. The accumulator theory of Audley and Pike (1965) is taken as an example of a theory which explains the second type of error; it predicts that, if change in identifiability is assumed to affect the probability of obtaining a correct reading from the stimulus, the latency of such errors will increase as identifiability increases, while the latency of correct responses decreases.

Experiment 1 used a difficult ten-choice identification task. Latency increased with the extent of the misjudgment, then declined on extreme misjudgments. Experiment 2 used a task with five stimuli and three responses. Latency again was greater on errors than on correct responses. Correct responses to more discriminable stimuli were faster and incorrect responses to such stimuli were slower than those to less discriminable stimuli, as predicted by the accumulator theory. If identifiability was reduced by increasing luminance or the interval between the stimulus and a masking field, however, the latency of the correct responses was slightly reduced and that of incorrect responses was greatly reduced. This is explained in terms of the accumulator theory by postulating a higher value of the criterion for response when the stimulus is less 'adequate'. An interaction between discriminability and adequacy in their effect on the latencies of correct and incorrect responses was also explicable in these terms.

1117. Wilding, J. M. The relation between latency and accuracy in the identification of visual stimuli. II. Theeffects of sequential dependencies. Acta Psychologica, 1971, 35, 399-413.

Data from the two experiments described in part I were examined for sequential effects. There was a significant tendency for high-numbered responses to follow high-numbered responses and low-numbered responses to follow low-numbered responses, and for errors to follow errors of the same degree and direction. This is explained in terms of a process comparing each stimulus with its predecessor (Holland and Lockhead, 1968). The increased latency of errors over correct response was greater when a similar stimulus or responses preceded than when a dissimilar one preceded. The accumulator theory (Audley and Pike, 1965) which was used to explain the results described in part I, is reinterpreted as a process comparing each stimulus with its predecessor. Preceding stimuli which the S judges to be more similar to the succeeding stimulus are assumed to enable a more accurate comparison and thus in effect to make the succeeding stimulus more discriminable. Therefore, as with more discriminable stimuli, the latency of correct responses decreases and that of incorrect responses increases, yielding a greater difference between the two.

1118. Wilkinson, R. T., & Stretton, M. Performance after awakening at different times at night. Psychonomic Science, 1971, 23, 283-285.

Naval ratings were roused during the night and presented themselves, dressed, for testing in a nearby room within 4 min. During the next 11 min, they were given tests of reaction time, calculation, and muscular coordination and steadiness. In all three tests, performance was well below the normal level achieved during the day. On different occasions, the men were roused at different times of night, and this factor influenced which task was affected most. Reaction time, with its intermittent call for rapid response, was impaired most in the early part of the night; the adding and coordination tasks, which demanded more continuous performance, were more affected later in the night. It is suggested that the early effects may be due to the depth of the preceding sleep, while the later ones may be influenced more by the trough in the circadian cycle of physiological activity.

1119. Williams, J. D. Memory ensemble selection in human information processing. Journal of Experimental Psychology, 1971, 88, 231-238.

This experiment investigated human information processing in a choice reaction time task requiring S to use memory information organized in subsets or ensembles which were characterized by co . The results indicated that S performed two serial memory-search operations in order to classify a stimulus as a member of the memory set: He first selected the appropriate ensemble for processing by conducting a serial, exhaustive scan of a memory set of ensemble-defining colors, and after ensemble selection, the selected ensemble was scanned serially. Equations were derived reflecting stimulus-encoding and response-decoding time, ensemble-selection rate, and the rate of scanning of the selected ensemble. It was demonstrated that S could reduce his processing load by scanning a single memory ensemble instead of his entire memory set.

1120. Williams, L. R. T. Refractoriness of a long movement. Research Quarterly, 1971, 42, 212-219.

A 75° swinging movement of the arm in the vertical plane was used to compare single channel and memory drum predictions regarding the psychological refractory period (PRP). While the changes in RT_2 were consistent with the single channel theory, in no case was it possible to reverse the movement once it was started. However, in 67% to 73% of the cases a deceleration of the arm swing in response to S_2 was observed, indicating start of the reversal. Results of the 1961 experiment of Henry and Harrison were confirmed.

1121. Williams, L. R. T. Refractoriness of an extended movement to directional change. Journal of Motor Behavior, 1971, 3, 289-300.

An extended movement was used to compare the memory-drum and single-channel definitions of psychological refractoriness. The basic movement in response to the first signal (S_1) was a forward lunge and a concurrent arm swing through a target string. The response to the second signal (S_2) was a reversal of the original movement. The interstimulus interval (ISI) ranged from .10 – .70 sec. in .10-sec. steps. The hypothesis that refractoriness of the reversal movement would decrease as ISI shortened was confirmed by the fact that error frequencies decreased significantly and substantially with decreasing ISI. The availability of some residual capacity to deal with S_2 during the refractory period was also indicated by an examination of the relationship between RT_2 and the interval between S_2 and RT_1 . This departure from the classical single-channel model shows some agreement with the neuromotor-programming theory.

1122. Williams, W. N., & LaPointe, L. L. Intra-oral recognition of geometric forms by normal subjects. Perceptual and Motor Skills, 1971, 32, 419-426.

Oral form recognition abilities were determined for 40 normal Ss between the ages of 20 and 59 yr., using 12 different geometric forms in 8 sizes. The purposes were: (1) to explore such related variables as form complexity, form size, Ss' age, sex and education level and Ss' response time; and (2) to reduce the total number of test items to a more manageable level by selecting those shapes and sizes from the original test items which contribute most to the obtained oral stereognosis scores. There were no significant differences for sex or educational level, but significant relations were found among performance levels and age groups. In addition, Ss' performance tended to be inversely related to response time. Within the limits of several criteria, 10 forms were selected which can practically and effectively provide a measure of oral form recognition. And, these forms may permit assessment of oral sensory integrity.

Y

1123. Yellott, J. I., Jr. Correction for fast guessing and the speed-accuracy tradeoff in choice reaction time. Journal of Mathematical Psychology, 1971, 8, 159-199.

In choice reaction time tasks, response latency varies as the subject changes his bias for speed vs accuracy; this is the speed-accuracy tradeoff. Ollman's Fast Guess model provides a mechanism for this tradeoff by allowing the subject to vary his probability of making a guess response rather than a stimulus controlled response (SCR). It is shown that the mean latency of SCR's (μ_s) in two-choice experiments can be estimated from a single session, regardless of how the subject adjusts his guessing probability. Three experiments are reported in which μ_s apparently remained virtually constant despite tradeoffs in which accuracy varied from chance to near-perfect. From the standpoint of the Fast Guess model, this result is interpreted to mean that the tradeoff here was produced almost entirely by mixing different proportions of fast guesses and constant (mean) latency SCRs. Thefinal sections of the paper discuss the question of what other models might be compatible with μ_s invariance.

Z

1124. Zahn, J. R., & Haines, R. F. The influence of central search task luminance upon peripheral visual detection time. Psychonomic Science, 1971, 24, 271-273.

Twenty Ss were exposed to a wide range of luminances (8.5, 55, 792, 6,800 fL) of a centrally located diffuse white search panel. Each S attempted to detect the onset of seven randomly presented test lights (90, 60, 30 deg of arc left and right of 0 deg of arc along the horizontal meridian) concurrently with a continuous search task. The findings suggest that the visual field constricts with an increased central panel luminance. This is shown by an increased peripheral detection time (DT) and by more undetected peripheral test lights, even though the difficulty of the central search task was held constant. These results on the effect of an environmental stressor (high luminance) upon peripheral DT are related to findings from previous investigations as well as various applied situations.

1125. Zukor, W. J. Contingent negative variation and motor readiness potential as distinct psychological and physiological phenomena. Dissertation Abstracts International (B), 1971, 31, 4534.

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